

# MSMR

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## MEDICAL SURVEILLANCE MONTHLY REPORT

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## Medical Evacuations from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF), Active and Reserve Components, U.S. Armed Forces, October 2001 - September 2009

There are many threats to the health and safety of U.S. military members, regardless of the natures or locations of their assignments. In addition, there are health threats directly related to combat service (e.g., battle injuries, psychological stress), and to operations conducted in areas with endemic diseases and minimal public health and public safety infrastructures.

Since October 2001, approximately two million U.S. service members have served one or more times in support of Operations Iraqi Freedom (OIF) and/or Enduring Freedom (OEF), mainly in Iraq and Afghanistan. In the theaters of operations, most medical care is provided by deployed military medical personnel; however, some injuries and illnesses require medical management outside the operational theater. In such cases, affected individuals are usually transported by air to a fixed military medical facility in Europe or the United States. At the fixed facility, they receive the specialized, technically advanced, and/or prolonged diagnostic, therapeutic, and rehabilitation care required.

Medical air transports ("medical evacuations") are costly and generally indicative of serious medical conditions. Some serious medical conditions are directly related to participation in or support of combat operations (e.g., battle wounds); many others are unrelated to combat and may be preventable. The objectives of this report are to characterize the natures and numbers of medical conditions for which U.S. military members were medically evacuated from the OEF and OIF theaters and to identify correlates of risk for these conditions.

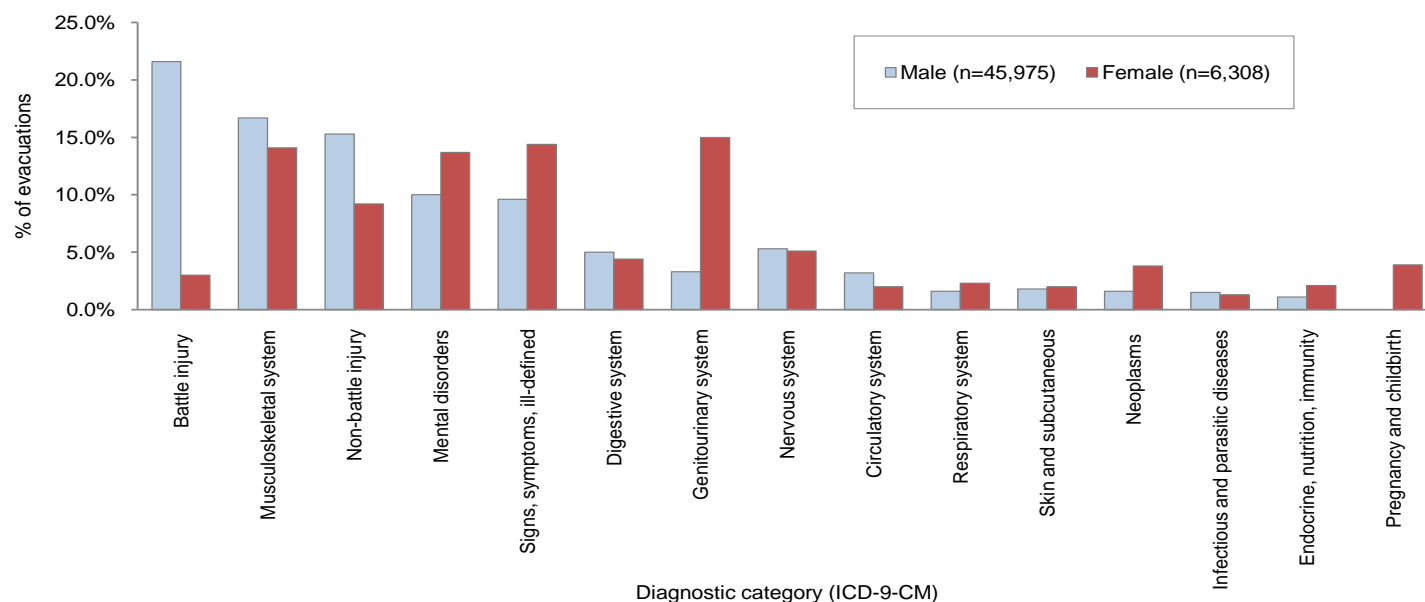
**Figure 1.** U.S. Central Command (CENTCOM) Area of Responsibility



### Methods:

The surveillance period was 1 October 2001 to 30 September 2009. The surveillance population included all U.S. service members of the Army, Navy, Air Force and Marine Corps who participated in OEF or OIF any time during the surveillance period. Records of all medical evacuations conducted by the U.S. Transportation Command (TRANSCOM) are routinely provided for health surveillance purposes to the Armed Forces Health Surveillance Center (AFHSC) via the Office of the Assistant Secretary of Defense

**Figure 2.** Diagnostic categories of medical evacuations from CENTCOM, by gender, U.S. Armed Forces, October 2001-September 2009



**Table 1.** Distribution of primary (first-listed) diagnoses during post-evacuation medical encounters among U.S. service members evacuated from OIF/OEF, October 2001-September 2009

	Total (2001-2009)		2001 (Oct-Dec)		2002		2003		2004		2005		2006		2007		2008		2009 (Jan-Sep)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Battle injury <sup>1</sup>	10,103	19	10	11	54	8	970	11	2,042	24	1,549	22	1,640	25	2,178	25	983	14	677	13
Musculoskeletal system (710 - 739)	8,543	16	25	27	93	14	1,284	15	1,396	16	1,244	18	1,085	16	1,287	15	1,253	18	876	17
Non-battle injury (800-999)	7,602	15	16	17	101	16	1,312	15	1,101	13	1,185	17	934	14	1,165	14	974	14	814	16
Mental disorders (290 - 319)	5,480	10	6	6	61	9	650	8	502	6	623	9	714	11	1,063	12	1,014	15	847	16
Signs, symptoms, ill-defined conditions (780 - 799)	5,300	10	7	8	96	15	942	11	856	10	637	9	618	9	824	10	750	11	570	11
Nervous system (320 - 389)	2,742	5	6	6	41	6	472	6	404	5	354	5	347	5	379	4	387	6	352	7
Digestive system (520 - 579)	2,595	5	0	0	52	8	611	7	602	7	284	4	234	4	362	4	267	4	183	3
Genitourinary system (580 - 629)	2,470	5	5	5	46	7	536	6	434	5	294	4	270	4	359	4	307	4	219	4
Circulatory system (390 - 459)	1,587	3	3	3	24	4	220	3	245	3	226	3	206	3	235	3	251	4	177	3
Neoplasms (140 - 239)	981	2	2	2	14	2	163	2	112	1	131	2	119	2	179	2	151	2	110	2
Skin and subcutaneous tissue (680 - 709)	953	2	0	0	10	2	250	3	157	2	131	2	81	1	115	1	132	2	77	1
Respiratory system (460 - 519)	874	2	2	2	10	2	207	2	151	2	118	2	111	2	103	1	102	1	70	1
Infectious and parasitic diseases (001 - 139)	770	1	3	3	7	1	225	3	240	3	67	1	50	1	58	1	73	1	47	1
Endocrine, nutrition, immunity (240 - 279)	643	1	1	1	9	1	98	1	94	1	99	1	82	1	88	1	88	1	84	2
Pregnancy and childbirth (630 - 679, relevant V codes)	248	0	2	2	3	<0.5	99	1	32	<0.5	17	<0.5	35	1	31	<0.5	14	<0.5	15	<0.5
Congenital anomalies (740 - 759)	167	<0.5	2	2	4	1	18	0	28	<0.5	26	<0.5	29	<0.5	23	<0.5	22	<0.5	15	<0.5
Hematologic disorders (280 - 289)	126	<0.5	0	0	2	<0.5	22	<0.5	13	<0.5	14	<0.5	15	<0.5	22	<0.5	17	<0.5	21	<0.5
Other (V01-V82, except pregnancy-related)	1,099	2	3	3	23	4	401	5	198	2	100	1	74	1	113	1	111	2	76	1
<b>Total</b>	<b>52,283</b>	<b>100</b>	<b>93</b>	<b>100</b>	<b>650</b>	<b>100</b>	<b>8,480</b>	<b>100</b>	<b>8,607</b>	<b>100</b>	<b>7,099</b>	<b>100</b>	<b>6,644</b>	<b>100</b>	<b>8,584</b>	<b>100</b>	<b>6,896</b>	<b>100</b>	<b>5,230</b>	<b>100</b>

<sup>1</sup>Battle injuries identified from TRANSCOM evacuation records.

for Health Affairs. For this report, the analysis data set included records of all evacuations of U.S. service members from the U.S. Central Command (CENTCOM) area of responsibility (AOR) (**Figure 1**) to a medical treatment facility outside the CENTCOM AOR; evacuations were included for analysis only if the affected service member had at least one inpatient or outpatient medical encounter in a U.S. military medical facility within ten days after the evacuation date.

Medical evacuations included in the analyses were classified by the causes and natures of the precipitating medical conditions (based on information reported in relevant evacuation and medical encounter records). First, all medical conditions that resulted in evacuations were classified as “battle injuries” or “non-battle injuries and illnesses” (based on entries in an indicator field of the TRANSCOM evacuation record). Evacuations due to non-battle injuries and illnesses were sub-classified into 18 illness/injury categories based on International Classification of Diseases (ICD-9-CM) diagnostic codes reported on records of medical encounters after evacuation. For this purpose, all records of hospitalizations and ambulatory visits from one day prior to ten days after the reported date of each medical evacuation were identified. The primary (first-listed) diagnosis for either a hospitalization (if one occurred) or the earliest ambulatory visit after evacuation was considered indicative of the condition responsible for the evacuation; diagnostic codes that specified illnesses and injuries (ICD-9-CM 001-999)

were prioritized over other codes (i.e., supplementary [“V”] and external cause of injury [“E”]).

Finally, the Kaplan-Meier survival method was used to estimate the cumulative probability of medical evacuation from OEF/OIF in relation to days deployed.

### Results:

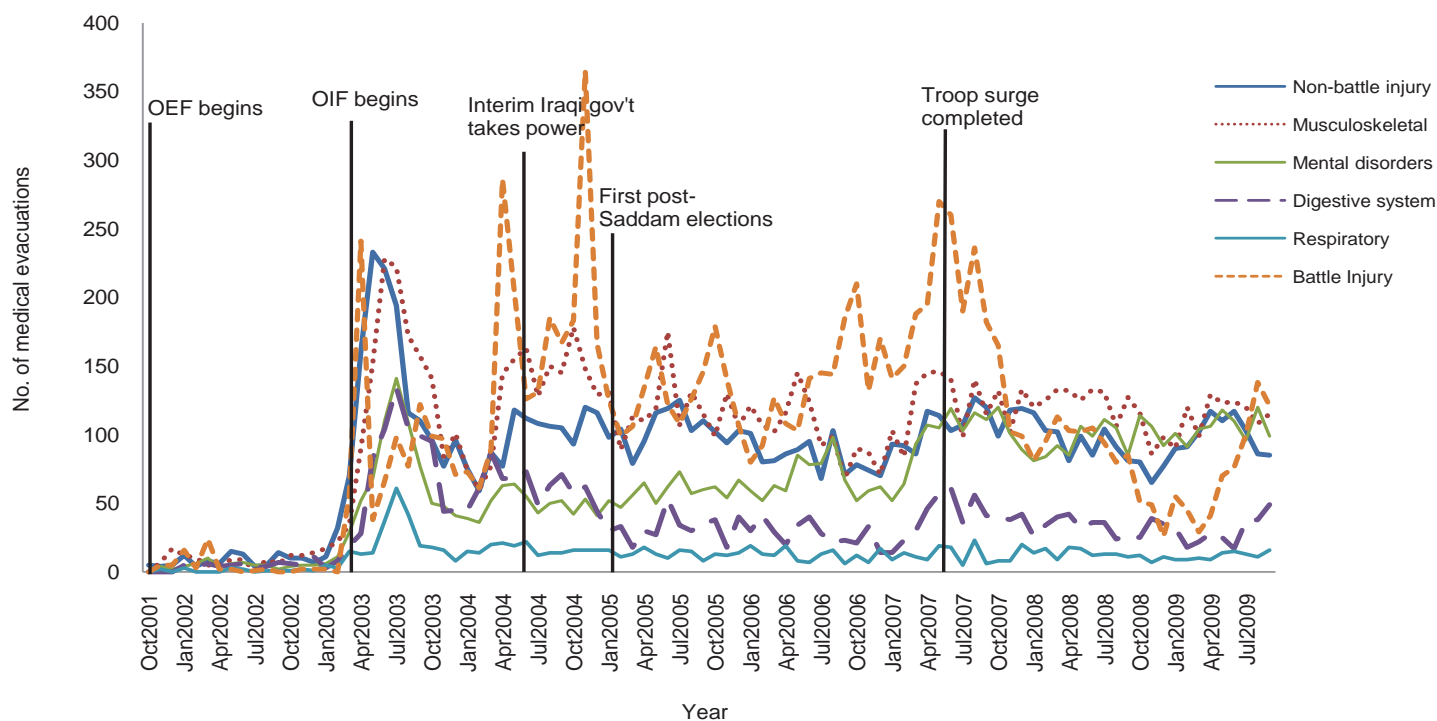
During the eight-year surveillance period, there were more than 54,000 medical evacuations of service members from OEF/OIF; of these, more than 52,000 (96%) had at least one documented medical encounter in a fixed medical facility outside the operational theater within 10 days of evacuation (**Table 1**).

Overall, nearly one-fifth (19%) of all medical evacuations were identified as battle injuries at the time of evacuation (**Table 1**). Four categories of illnesses and injuries accounted for the majority (51%) of all evacuations: musculoskeletal disorders (16%), primarily affecting the back and knee; non-battle injuries (15%); “mental disorders” (10%), of which the majority were adjustment reactions or affective psychoses; and signs, symptoms and ill-defined conditions (10%)—of which more than one-quarter were “respiratory symptoms”.

There were clear differences in the major causes of medical evacuations among males and females (**Figure 2**). Among males, approximately half of all medical evacuations were attributable to “battle injuries” (22%),



**Figure 3.** Medical evacuations from OIF/OEF, by month and diagnostic category, U.S. Armed Forces, October 2001-September 2009



“musculoskeletal disorders” (17%) and non-battle-related injuries (15%). Among females, approximately half of all evacuations were attributable to “genitourinary disorders” (15%), “signs, symptoms, and ill-defined conditions” (14%), “musculoskeletal disorders” (14%), and “mental disorders” (13%) (Figure 2).

The numbers and proportions of medical evacuations attributable to battle injuries varied considerably during the period (Table 1). For example, battle injuries accounted for at least 22% of all medical evacuations during each of the years from 2004 to 2007 but fewer than 15% in all other years. Of note, the increase in the number of battle injuries from 2004 to 2007 was not accompanied by increases in other injury-related categories (e.g., “non-battle injury,” “musculoskeletal disorders”); the finding suggests that battle injuries were well differentiated from non-battle injuries on medical evacuation records.

In general, evacuations for “mental disorders” were fairly stable from 2003 through 2006 and then increased (by approximately 50%) from 2006 ( $n=714$ ) to 2007 ( $n=1063$ ) (Table 1). Mental disorders accounted for 6-9% of medical evacuations each year from 2001 through 2005; since 2005, the proportion of medical evacuations attributable to mental disorders has monotonically increased (Jan-Sep 2009: 16%). Of note, the sharp increase in battle injuries from 2003 ( $n=970$ ; 11%) to 2004 ( $n=2042$ ; 24%) was not accompanied by a rise in evacuations for mental disorders (2003:  $n=650$ ; 8%; 2004:  $n=502$ ; 6%).

For some categories of illnesses and injuries, the numbers of evacuations per month dramatically varied over the period.

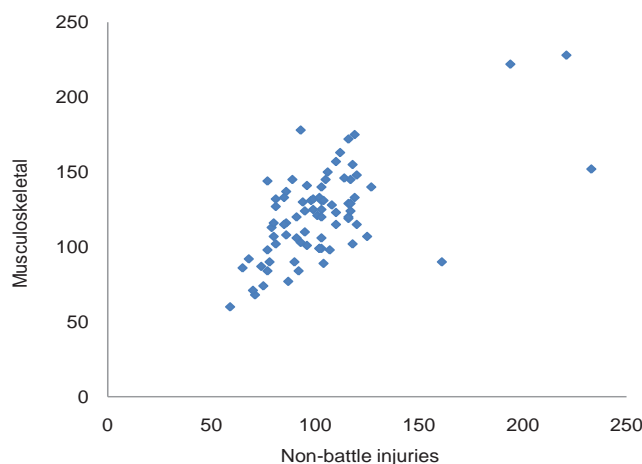
For example, there were sharp spikes in evacuations for battle injuries in April 2003, April 2004, and November 2005; and in most months from January 2004 through October 2007, battle injuries accounted for more evacuations than any other single category of conditions. Relatively high numbers and sharp spikes of battle injury-related evacuations were temporally related to military and political conditions and events in Iraq (Figure 3). In contrast, evacuations for “musculoskeletal disorders” and “non-battle injuries” were fairly stable from 2004 through the end of the period; together, these conditions consistently accounted for more evacuations than any other category. Of note, evacuations for mental disorders were fairly stable from October 2003 through January 2007, sharply increased through the first three months of 2007, and have remained fairly stable at a higher level since then. The sharp increase in mental disorder-related evacuations in early 2007 coincided with an increase (“surge”) in deployed troops beginning in January 2007.

There was an obvious positive relationship between evacuations for “musculoskeletal disorders” each month and “non-battle injuries” in the same month (Figure 4). This is not surprising because the categories are medically, and in many cases causally, related. There were not strong correlations between medical evacuations for battle injuries and non-battle injuries in the same months or for battle injuries and mental disorders (either in the same month or with battle injuries preceding mental disorders by one month) (Figure 4).

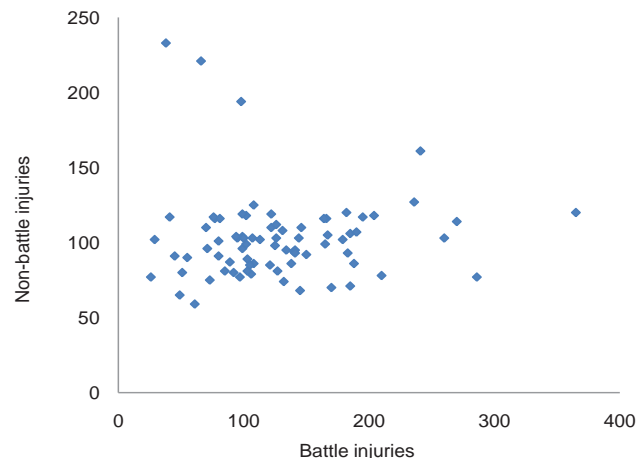
During 12 months of deployment to OEF/OIF, members of the Army, Marine Corps, Air Force and Navy were estimated to have approximately 4%, 2%, 1%, and less than

**Figure 4.** Pairwise comparisons of numbers of evacuations per month, by diagnostic category, U.S. Armed Forces, October 2001-September 2009

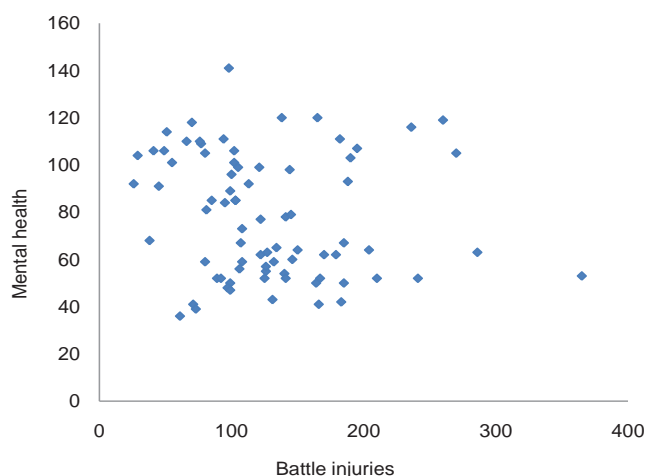
a. Musculoskeletal disorders vs. non-battle injuries



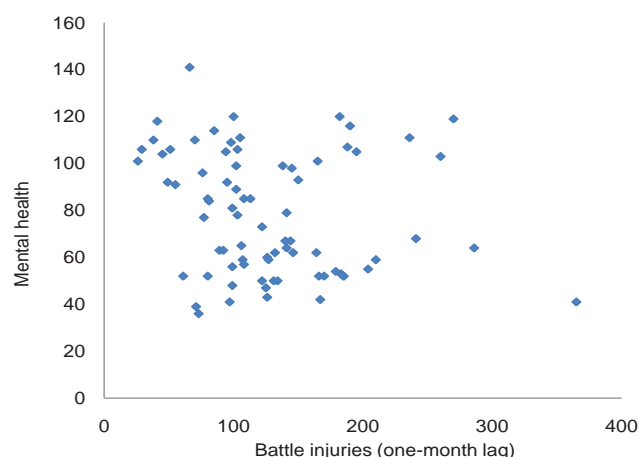
b. Non-battle injuries vs. battle injuries



c. Mental disorders vs. battle injuries



d. Mental disorders vs. battle injuries (one-month lag)



1% probabilities, respectively, of being medically evacuated from the theater of deployment (**Figure 5**). In each of the Services except the Air Force, Reserve component members compared to their active component counterparts were more likely to require medical evacuation during deployment (**Figure 6**). Differences in the likelihood of medical evacuation for Reserve and active component members appeared to increase with time deployed for both the Army and Navy. For the Marine Corps, the estimated survival curves of Reserve and active component members appeared similar for approximately the first 130 days after deployment; beyond 130 days of deployed service, Reserve compared to active component Marines were more likely to require medical evacuation.

Among deployers who were medically evacuated for illnesses or non-battle injuries, there were strong associations between the category of the illness or injury that precipitated

the evacuation and having a medical encounter for an illness or injury in the same category within 90 days before deploying (**Figure 7**). For example, of all deployers who were medically evacuated for musculoskeletal, respiratory, nervous system, or mental disorders, 29%, 23%, 22%, and 18%, respectively, had at least one medical encounter for the same category within 90 days before deploying. In comparison, among deployers who were medically evacuated for conditions other than musculoskeletal, respiratory, nervous system, or mental disorders, only 13%, 11%, 12%, and 4% had encounters in those categories, respectively, within 90 days prior to deploying (**Figure 7**).

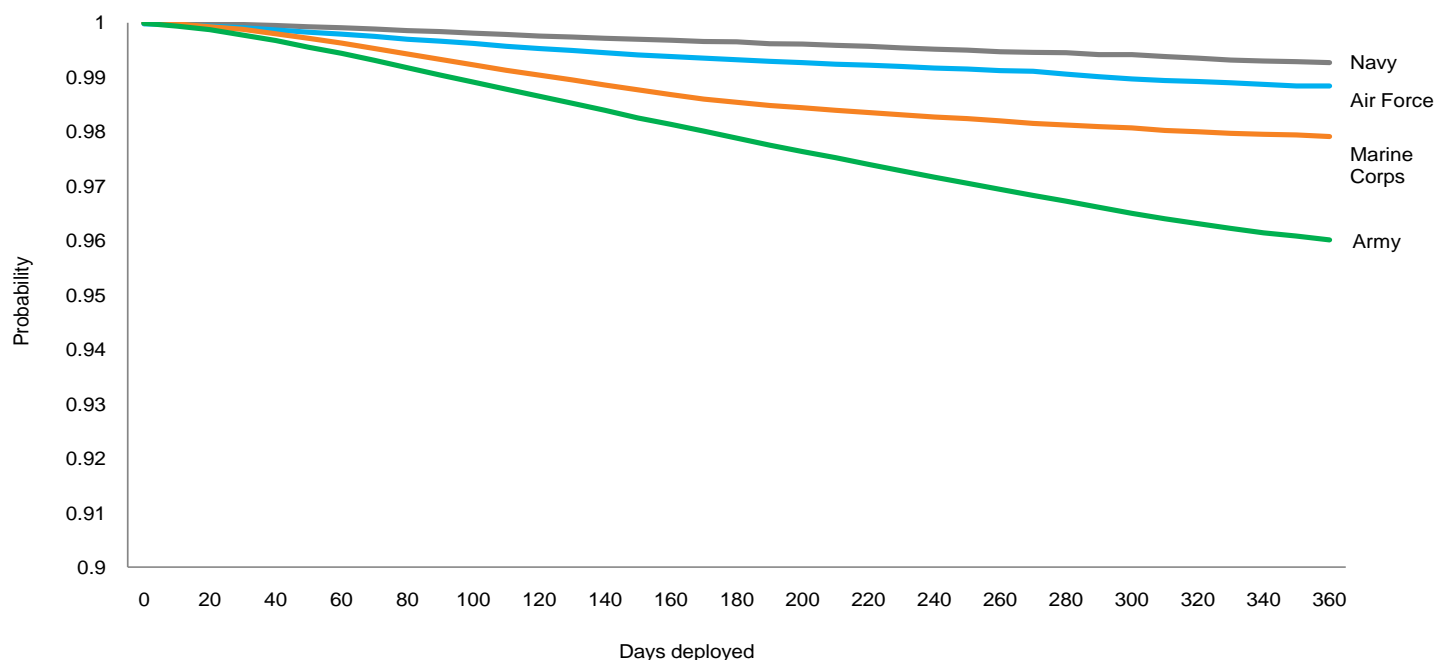
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#### Editorial comment:

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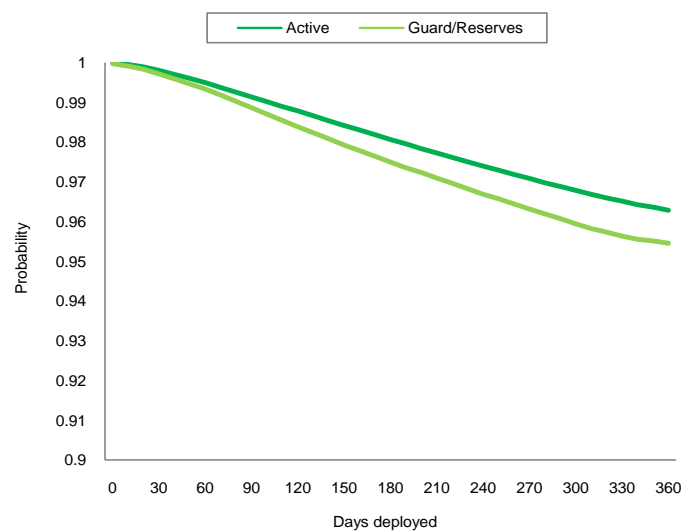
The likelihood of a medical evacuation from OIF/OEF during 12 months of deployment was approximately 4%

**Figure 5.** Probability of remaining free of medical evacuation during service in OIF/OEF (Service branch comparison:  $p\text{-value} < 0.001$ )

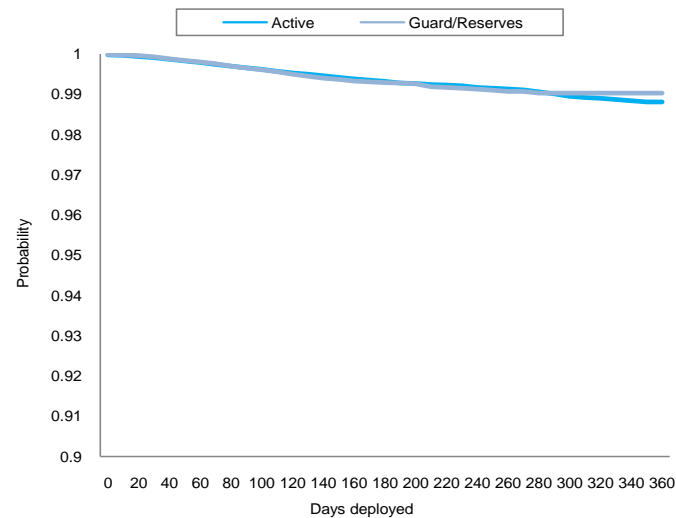


**Figure 6.** Probability of remaining free of medical evacuation during service in OIF/OEF, by service, October 2001- September 2009

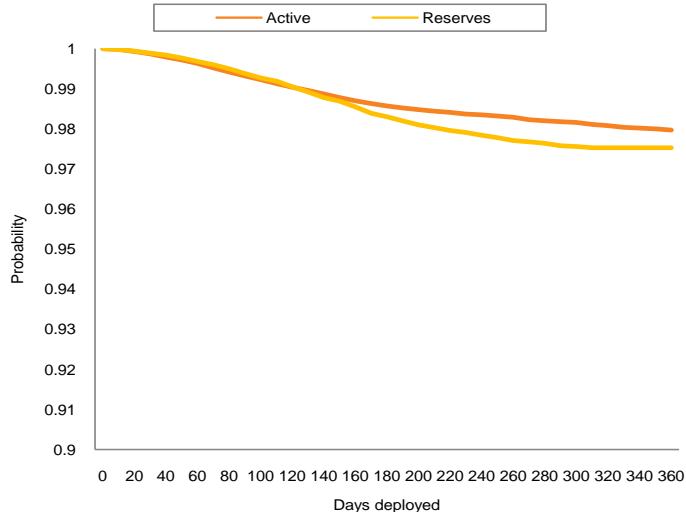
a. Army



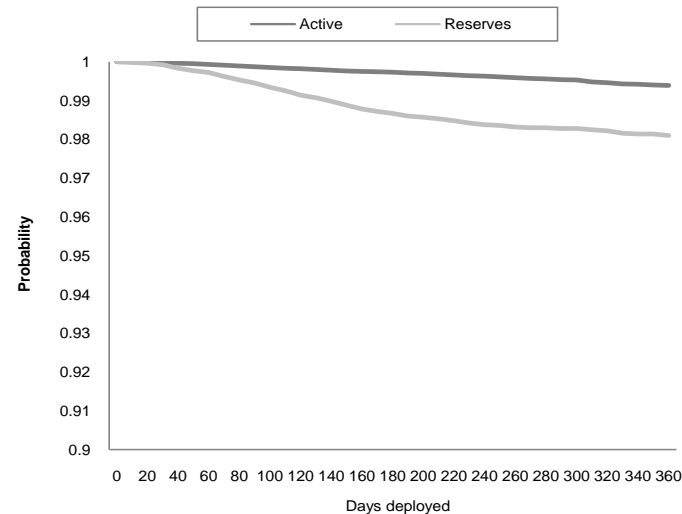
b. Air Force



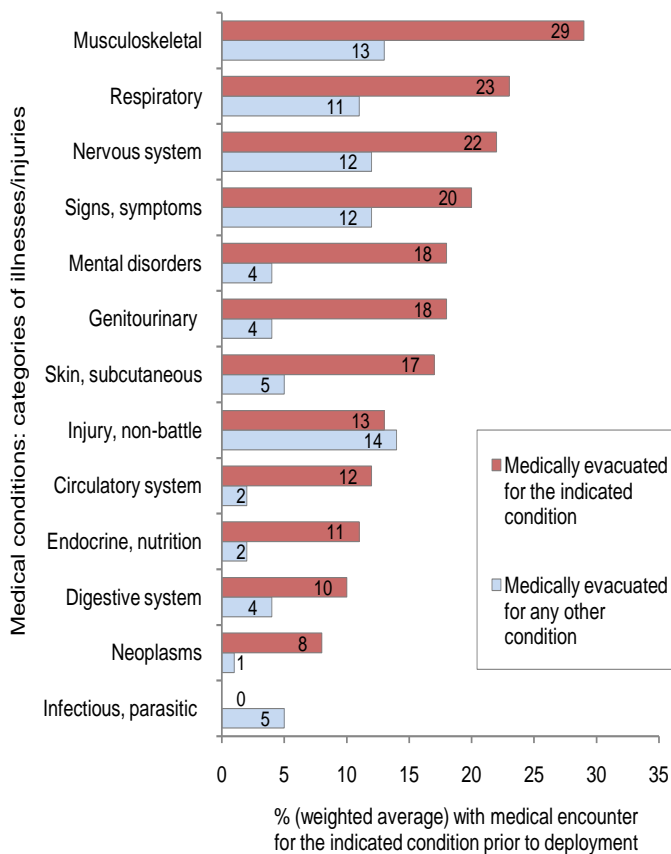
c. Marine Corps



d. Navy



**Figure 7.** Among deployers who were medically evacuated from OIF/OEF, percentages with medical encounters for various conditions within 90 days prior to deployment, U.S. Armed Forces, October 2001-September 2009



among Army, 2% among Marine Corps, and 1% among other Service members. The relatively low likelihood of medical evacuation suggests that most deployers were sufficiently healthy and fit, and received the medical care in theater necessary, to complete their OEF/OIF assignments.

There are limitations of the analysis that should be considered when interpreting the results. For example, assessments of trends were based on numbers of medical evacuations per month or year; however, variations in the numbers of deployed troops (i.e., the population at risk of medical evacuation) were not accounted for. Because the numbers of deployed troops significantly varied over the period, trends of medical evacuations do not directly reflect changes in medical evacuation risk over time. Also, comparisons of probabilities of medical evacuation across Services and components do not account for military (e.g., military occupations, grades) and demographic (e.g., age, gender) differences that may be related to evacuation risk. For example, compared to their respective counterparts, Army and Marine Corps deployers are more likely to be in combat-specific occupations, and Reserve component deployers tend to be older. In addition, the natures and intensities of battle and non-battle-related medical threats in Afghanistan

and Iraq differ from each other and vary in each location over time. However, for this analysis, medical evacuations from Afghanistan and Iraq were analyzed together. With consideration of the limitations of the analysis, several findings are potentially interesting and useful.

The analysis documented that, throughout OEF and OIF (even during periods of the most intensive combat), most medical evacuations were not directly related to battle injuries. Overall, approximately four of every five medical evacuations were due to illnesses and non-battle injuries; and of these, more than one-half were due to musculoskeletal disorders (16%), non-battle injuries (15%), mental disorders (10%), and signs, symptoms, and ill-defined conditions (10%). Relatively large proportions of service members evacuated for illnesses and non-battle injuries had medical encounters for the same or closely related conditions within 90 days before deploying. The findings suggest that many medical evacuations were for exacerbations or recurrences of preexisting physical and mental conditions. Further analyses should identify conditions that are most likely to recur or worsen during, and require medical evacuation from, combat deployments.

Of note, medical evacuations for mental disorders were not temporally associated with evacuations for battle injuries. For example, evacuations for battle injuries were much higher from 2004 to 2007 than before or after that period. Evacuations for mental disorders were not particularly high from 2004 to 2006; however, they sharply increased during the first three months of 2007 to a higher, relatively stable monthly incidence. The sudden increase in evacuations for mental disorders in 2007 coincided with the surge in deployed U.S. troops and a change in strategy in Iraq; the increase may reflect cumulative stress among individuals deployed more than once and/or increased awareness and concern regarding psychological stress-related disorders (e.g., PTSD, depression, suicide ideation) among deployed service members.

In summary, there have been over 50,000 medical evacuations of U.S. service members from Iraq and Afghanistan; however, probabilities of medical evacuation during a 12-month deployment are relatively low. Throughout the period, there were many more medical evacuations for illnesses and non-battle injuries than for battle injuries; and many deployers evacuated for illnesses and non-battle injuries had medical encounters for the same or related conditions shortly prior to deployment. There may be opportunities to refine predeployment medical assessment procedures to reduce recurrences and exacerbations of preexisting conditions and thereby decrease related medical evacuations among deployed service members.

*Data analysis and report by Timothy E. Powers, MS, Data Analysis Group, Armed Forces Health Surveillance Center.*



## Accidental Injuries from Hand-to-Hand Combat Training and Combat Sports, U.S. Armed Forces, 2002-2009

Because U.S. military members are all volunteers, their willingness to engage in battle is implicit. On the modern battlefield, there are no front lines; the modern warrior must be physically and psychologically prepared to engage an enemy face-to-face at any moment. To reinforce the warrior ethos, U.S. military members are trained to fight within the range of physical contact, either empty-handed or with weapons that cannot be fired ("hand-to-hand combat"). The current hand-to-hand combat curricula are known as the Modern Army Combatives Program (MAC),<sup>1</sup> formally implemented in 2005 and adopted by the U.S. Air Force in 2007, and the Marine Corps Martial Arts Program (MCMAP),<sup>2</sup> established in 2001 to train Marines and Navy personnel attached to Marine units. Both programs teach a mix of self defense and martial art techniques that include grappling (e.g., wrestling and judo), striking (e.g., boxing and kickboxing), and weapons training (e.g., bayonet and stick fighting).

Physical fighting skills are introduced during initial entry training of Army and Marine Corps recruits; the training may continue throughout an individual's service career, even while deployed. MCMAP's colored belt achievement system encourages continued skill development, and Service-sponsored "combatives tournaments" offer male and female soldiers opportunities to compete. In addition, service members may participate in organized combat sports while off duty.

The practice of hand-to-hand fighting is inherently dangerous and creates a potential for training- and sports-related injuries among military members. This report describes the natures and estimates the frequencies of accidental injuries from hand-to-hand combat training or combat sports that resulted in hospitalizations or medical evacuations of U.S. service members since 2002.

**Table 1.** Hospitalizations and medical air transports for injuries due to hand-to-hand combat training or combat sports, U.S. Armed Forces, 2002-2009

Cause of injury <sup>1</sup>	No. of hospitalizations	No. of evacuations from CENTCOM	Total
Boxing	54	27	81
Wrestling, judo and unarmed combat training	485	245	730
<b>Total</b>	<b>539</b>	<b>272</b>	<b>811</b>

<sup>1</sup>Cause determined by NATO Standard Agreement codes (IAW STANAG 2050).

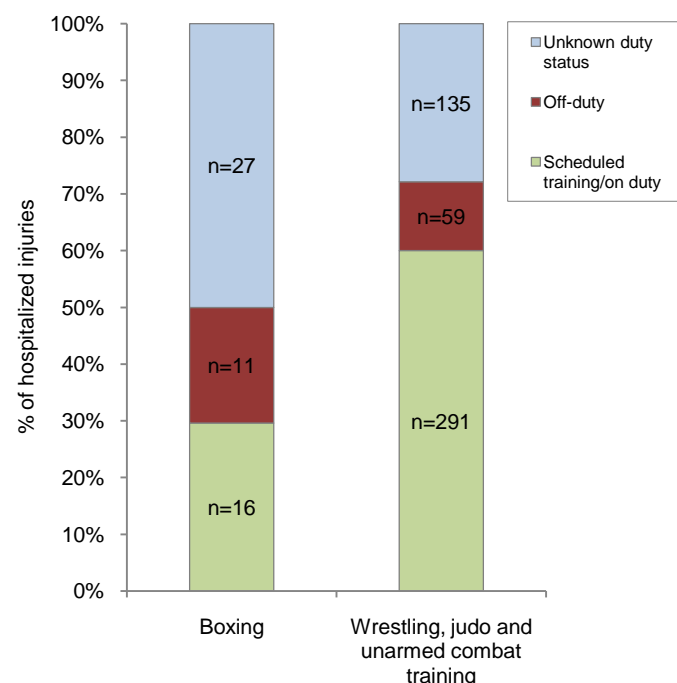
### Methods:

The surveillance period was January 2002 through December 2009. The surveillance population was comprised of individuals who served in an active or Reserve component of the Army, Navy, Air Force or Marine Corps at any time during the surveillance period. Accidental injuries from hand-to-hand combat training and combat sports were identified from standardized records of (a) hospitalizations in U.S. military medical facilities and (b) medical evacuations (by air transport) from the U.S. Central Command (CENTCOM) theater of operations.

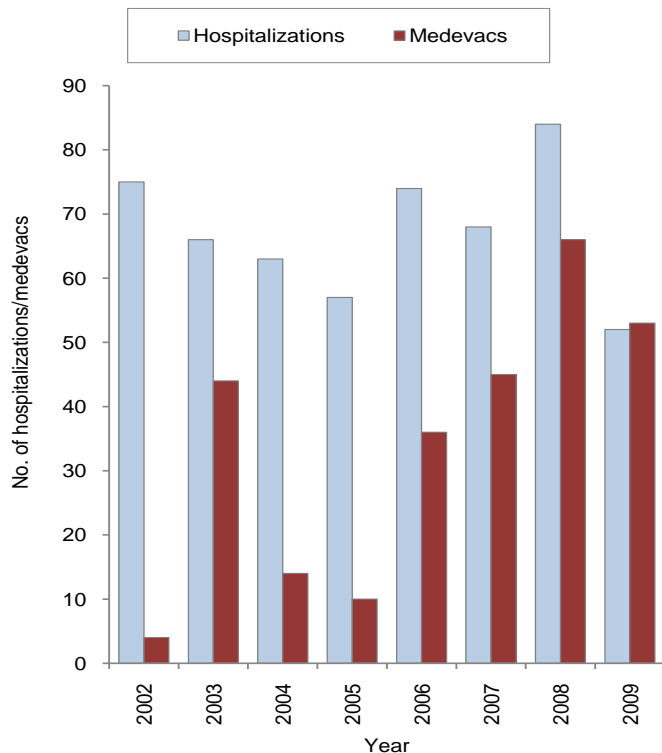
Hospitalized injuries due to boxing, wrestling, judo or unarmed combat training were defined by records of hospitalizations that indicated that the subject injury was caused by "boxing" or "wrestling, judo and unarmed combat training" (per Standard NATO Agreement [STANAG] causative agent codes) and was accidental (not intentionally inflicted) (per STANAG general class of trauma codes).

To identify injuries from hand-to-hand combat training or combat sports that resulted in evacuation from CENTCOM, patient histories found in all Transportation Command Regulating and Command and Control Evacuation System

**Figure 1.** Circumstances of hospitalized injuries for boxing, wrestling, judo and unarmed combat training (as determined by STANAG "general class of trauma codes"), active and Reserve component, U.S. Armed Forces, 2002-2009



**Figure 2.** Hospitalizations and medical evacuations (medevacs) for injuries due to hand-to-hand combat training and combat sports, by year, active and Reserve component, U.S. Armed Forces, 2002-2009



(TRAC2ES) transport records during the surveillance period were searched for case indicator keywords including “boxing”, “combatives”, “hand to hand”, “martial art”, “MCMAP”, “self defense” and “wrestling”. Patient histories (free text fields that describe the injuries or illnesses of medically evacuated patients) that met text search criteria were reviewed for relevance to this surveillance. War-related injuries and humeral fractures due to “arm wrestling” (n=11) were excluded (see page 12).

Because some injuries result in multiple medical encounters, only one injury-related hospitalization per service member per 90 days was included in the analysis. Also, hospitalizations within 30 days following an injury-related medical evacuation were considered related to the same injury episode; hence, they were not included as incident hospitalized cases. The natures and anatomic locations of injuries were ascertained from primary (first-listed) diagnoses recorded on hospitalization and evacuation records of each hand-to-hand combat-related accidental injury. The Defense Medical Surveillance System (DMSS) was used to validate the military status, obtain demographic and military characteristics, and identify the location of hospitalization of each affected individual.

#### Results:

From 2002 through 2009, there were 539 hospitalizations of U.S. military members (not related to deployment) for

accidental injuries due to hand-to-hand combat training or combat sports (“combatives”) (Table 1). Of all combatives-related injuries that required hospitalization, most by far (n=485; 90%) were related to “wrestling, judo and unarmed combat training”; relatively few (n=54; 10%) were related to boxing (Table 1).

During the same eight-year period, 272 service members were evacuated from CENTCOM theaters of operations for treatment of injuries related to hand-to-hand combat training, wrestling, martial arts, or boxing. Of all military members medically evacuated for combatives-related injuries, most by far (n=245; 90%) had case records that specifically mentioned combatives training, MCMAP, wrestling or martial arts; relatively few (n=27; 10%) case records cited “boxing” (Table 1).

Of all injuries from “wrestling, judo and unarmed combat training” that required hospitalization, 60% occurred during “schemes and exercises” and “other scheduled training” (n=208) or otherwise while “on duty” (n=83); 12% occurred while “off-duty”; and the relationship of the others to duty status was “unknown.” Of boxing injuries that required hospitalization, 30% occurred during training/while on

**Table 2.** Demographic and military characteristics of service members with hospitalized or aeromedically evacuated injuries due to hand-to-hand combat training or combat sports, U.S. Armed Forces, January 2002-December 2009

	No. injured	% injured
Total	811	100.0
<b>Service</b>		
Army	478	58.9
Navy	51	6.3
Air Force	41	5.1
Marine Corps	241	29.7
<b>Component</b>		
Active	657	81.0
Reserve/Guard	154	19.0
<b>Sex</b>		
Male	753	92.8
Female	58	7.2
<b>Race ethnicity</b>		
Black non-hispanic	91	11.2
White non-hispanic	558	68.8
Other	162	20.0
<b>Age</b>		
<20	121	14.9
20-24	345	42.5
25-29	168	20.7
30-34	77	9.5
35-39	57	7.0
40+	43	5.3
<b>Military occupation</b>		
Combat	221	27.3
Health care	41	5.1
Other	549	67.7

**Table 3.** Primary (first-listed) diagnoses of hospitalized and medically evacuated injuries from hand-to-hand combat training and combat sports, active and Reserve component, U.S. Armed Forces, January 2002 - December 2009

Primary diagnosis (dx1)	Boxing	Wrestling, judo, combatives	Total
Other fractures (805-829)	19	363	382
Sprains and strains (840-848)	8	95	103
Dislocations (830-839)	6	60	66
Skull or face bone fractures, intracranial injury (800-804, 851-854)	21	43	64
Arthropathies, dorsopathies, and rheumatism (710-729)	4	54	58
Concussion, unspecified head injury (850, 959.01)	10	22	32
Traumatic complications, unspecified injuries (958-959)	2	22	24
Internal injuries (860-869)	3	16	19
Contusions (920-924)	2	10	12
Nerve or spinal cord injury (950-957)	0	10	10
Wounds (870-879)	0	4	4
Crushing injury (925-929)	0	2	2
Disorders of eye, adnexa (360-379)	0	1	1
Injury to blood vessel (900-904)	0	1	1
Other injuries	6	27	33
<b>Total</b>	<b>81</b>	<b>730</b>	<b>811</b>

duty and 20% occurred while off-duty; the relationship to duty status was not defined for the others (n=27; 50%) (Figure 1). Of all combatives-related injuries that required hospitalization, 38 (7%) occurred on board ships (data not shown).

During the period, the annual number of hospitalizations for injuries related to hand-to-hand combat remained relatively stable (range: 52 in 2009 to 84 in 2008). The number of medical evacuations for combatives-related injuries increased by 50% between 2003 and 2008 and was much more variable overall (range, per year, 2002-2009: 4-66) (Figure 2).

Of all military members who were hospitalized or medically evacuated for combatives-related injuries during the period, most (89%) were in the Army (n=478) or Marine Corps (n=241), and more than 80% were in the active component (n=657) (Table 2). Compared to U.S. military members in general, those who were hospitalized or medically evacuated for combatives-related injuries were younger and more often males and in combat occupations (Table 2).

The types and anatomic locations of boxing-related injuries significantly varied from those due to non-boxing combatives (e.g., wrestling, judo, martial arts). For example, serious head injuries (i.e., skull/facial fractures, intracranial injuries) accounted for more than one-quarter (n=21) of all boxing-related injuries but only 6% (n=43) of all other combatives-related injuries considered in this report. Fractures (not of the skull) — primarily of the ankle, tibia, or fibula — accounted for nearly one-half (n=363) of all non-boxing injuries but less than one-quarter (n=19) of the

boxing injuries considered here (Table 3). Also, nearly 40% of all boxing-related injuries (but only 16% of other combatives-related injuries) primarily affected the head, neck, back, or central nervous system (e.g., brain, spinal cord); in contrast, more than 45% of non-boxing combatives-related injuries (but only 14% of boxing injuries) primarily affected the lower extremities (Figure 3).

During the period studied, hospitalizations (not including medical evacuations) for combatives-related injuries were reported at military medical facilities on more than 50 installations; eleven installations accounted for more than 20 hospitalizations each during the period (Table 4). The medical facilities with the most hospitalizations for combatives-related injuries were the Navy Medical Center, San Diego, CA and the Navy Hospital, Beaufort, SC; in addition to other installations, those facilities support the Marine Corps Recruit Depots at San Diego and Parris Island, respectively. The Army facilities with the most combatives-related hospitalizations were at Ft. Knox, KY and Fort Benning, GA. In addition to other missions, Fort Knox and Fort Benning are large basic combat training installations, and Fort Benning is home to the U.S. Army Combatives School. Outside the United States, the U.S. military hospitals at Landstuhl, Germany and Seoul, Korea treated relatively large numbers of military members for combatives-related accidental injuries (Table 4).

*Data summaries by Gi-Taik Oh, Data Analysis Group, AFHSC.*

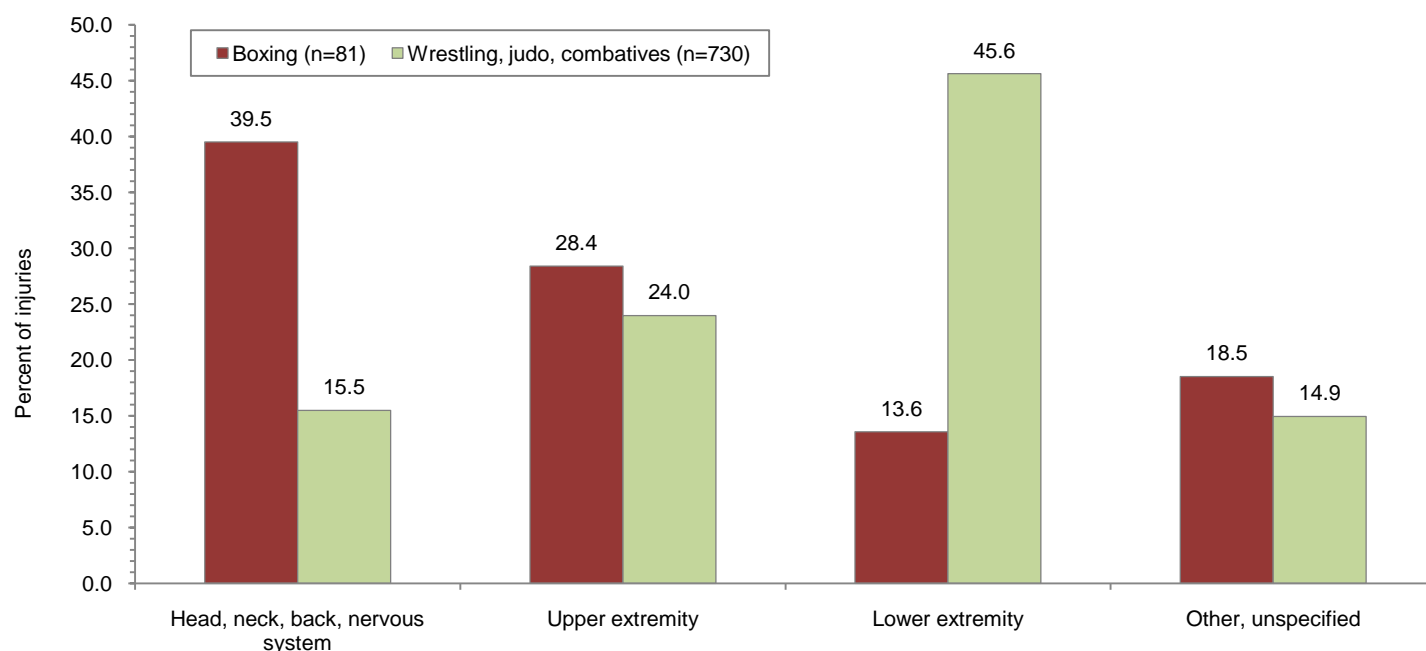
#### Editorial comment:

This report documents that during the past eight years, an average of 100 U.S. military members per year were hospitalized or medically evacuated from a combat theater of operations for accidental boxing, wrestling or combatives

**Table 4.** Combatives-related injury hospitalizations, by installation (among installations with at least 20 hospitalizations during the period), active and Reserve components, U.S. Armed Forces, January 2002 - December 2009

Location of diagnosis	No. of hospitalizations
NMC San Diego, CA	36
NH Beaufort, SC	36
Ft. Knox, KY	32
Ft. Benning, GA	31
Landstuhl, Germany	31
Ft. Shafter, HI	30
Seoul, Korea	30
Ft. Jackson, SC	26
NH Camp LeJeune, NC	24
NMC Portsmouth, VA	22
Ft. Riley, KS	21

**Figure 3.** Anatomical distribution (%) of hospitalized and medevaced injuries from hand-to-hand combat training and combat sports, by activity type, U.S. Armed Forces, 2002-2009



training-related injuries. Most of the injuries considered in this report occurred during supervised military training.

The MSMR recently summarized hospitalizations for assault-related injuries that occurred during fights and brawls among U.S. military members.<sup>3</sup> In the context of all intentional and unintentional hospitalized injuries from fighting, accidental injury hospitalizations due to hand-to-hand combat training or combat sports account for less than one-sixth of “fighting”-related hospitalizations. While there were relatively few service members hospitalized or medically evacuated for combatives-related accidental injuries, the types and anatomic locations of the injuries were significant. For example, there were severe traumatic injuries of the head (e.g., skull fractures), brain (e.g., hemorrhage), and spinal cord; and the average length of hospitalization for all injuries considered here was 4.7 days (data not shown).

This report only considered hospitalized and medically evacuated cases; thus, it is not a complete accounting of all accidental injuries and associated costs (e.g., medical care, lost duty time) related to boxing, wrestling, and other hand-to-hand combatives. For each hospitalized or medically evacuated injury summarized here, there were undoubtedly many others treated at emergency clinics and other ambulatory settings; hence, the findings document the “tip of the injury iceberg.”

The findings of this report should be interpreted cautiously in light of several limitations. The analysis was based on standardized hospitalization and medical evacuation records that indicated accidental injuries related to boxing, wrestling or training in combatives/martial arts. In turn, the completeness and accuracy of case ascertainment depended

on the completeness and accuracy of documenting, coding, and entering relevant data – which likely varied between military treatment facilities. Also, changes in the annual numbers of service members medically evacuated for various conditions reflect changes in the numbers of service members who are deployed (i.e., at risk of medical evacuation).

Hand-to-hand combat training is useful for developing confidence, mental discipline and physical fighting skills that warriors may need in combat situations. However, there are costs inherent to learning and enhancing hand-to-hand combat skills and cultivating the fighting spirit essential to warriors. Leaders and developers of hand-to-hand combat training programs should identify preventable threats to the health and safety of participants; in particular, they should identify and enforce practices and equipment to reduce the most frequent and serious injuries — such as head, neck, and spinal cord traumatic injuries; ankle and leg fractures.<sup>4</sup> While the training is essential, it should be conducted in as safe a manner as possible.

#### References:

1. U.S. Army Field Manual (FM) 3-25.150 Combatives.
2. Department of the Navy. Marine Corps Order 1500.54A. Subject: Marine Corps Martial Arts Program. Accessed 5 February 2010 at: <http://www.marines.mil/news/publications/Documents/MCO%201500.54A.pdf>
3. Armed Forces Health Surveillance Center. Hospitalizations for assault-related injuries, active component, U.S. Armed Forces, January 1998-June 2007. *Medical Surveillance Monthly Report (MSMR)*; 2008 Jan;15(1):2-8.
4. dela Cruz GG, Knapik JJ, Birk MG. Evaluation of mouthguards for the prevention of orofacial injuries during United States Army basic military training. *Dent Traumatol*. 2008 Feb;24(1):86-90.



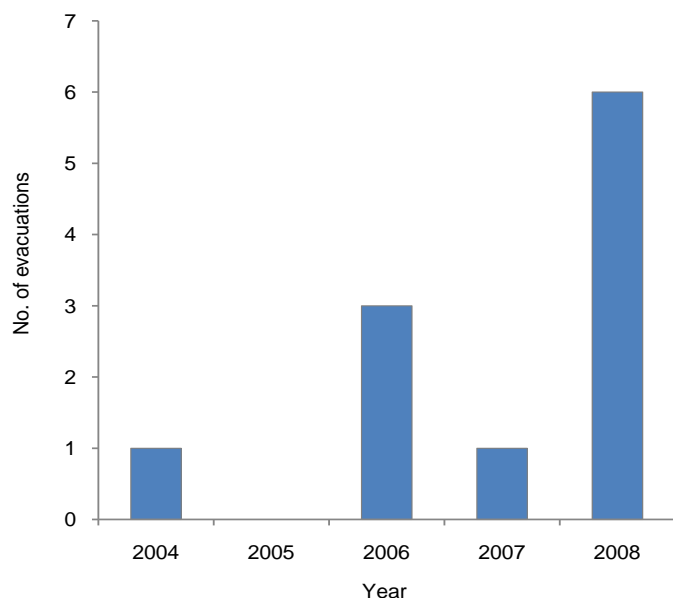
## SURVEILLANCE SNAPSHOT:

### Medical evacuations for humeral fractures due to arm wrestling

Between 2002 and 2009, 11 service members were medically evacuated from CENTCOM for humeral fractures that occurred while arm wrestling (see page 9). All were soldiers except one (a Marine); six were active component members, four were National Guard members and two served in the Army Reserve. The median age was 23 (range 20-33). Six of the 11 evacuations occurred in calendar year 2008 (**Figure 1**).

One of the evacuated service members reported that he was arm wrestling when he “twisted his body and heard a loud crack”. Arm wrestling can place an unusual amount of torque on the humeral bone. When an arm wrestler rotates the shoulders in the same direction as the hand, torque is increased and can result in humeral fracture.<sup>1</sup> In a sanctioned arm wrestling competition in the United States, a referee would interrupt a match for a “break arm” position, defined as that in which the competitor is turning away from the hand or allowing the shoulder to be in front of the hand (**Figure 2**).<sup>2</sup>

**Figure 1.** Medical evacuations from CENTCOM due to arm wrestling, U.S. Armed Forces, 2002-2009



**Figure 2: “Break arm” position:** The competitor on the right is in an injury prone position because his shoulder is forward of his hand. To prevent injury, an arm wrestler should keep the shoulder behind or in line with the hand, as the competitor on the left.

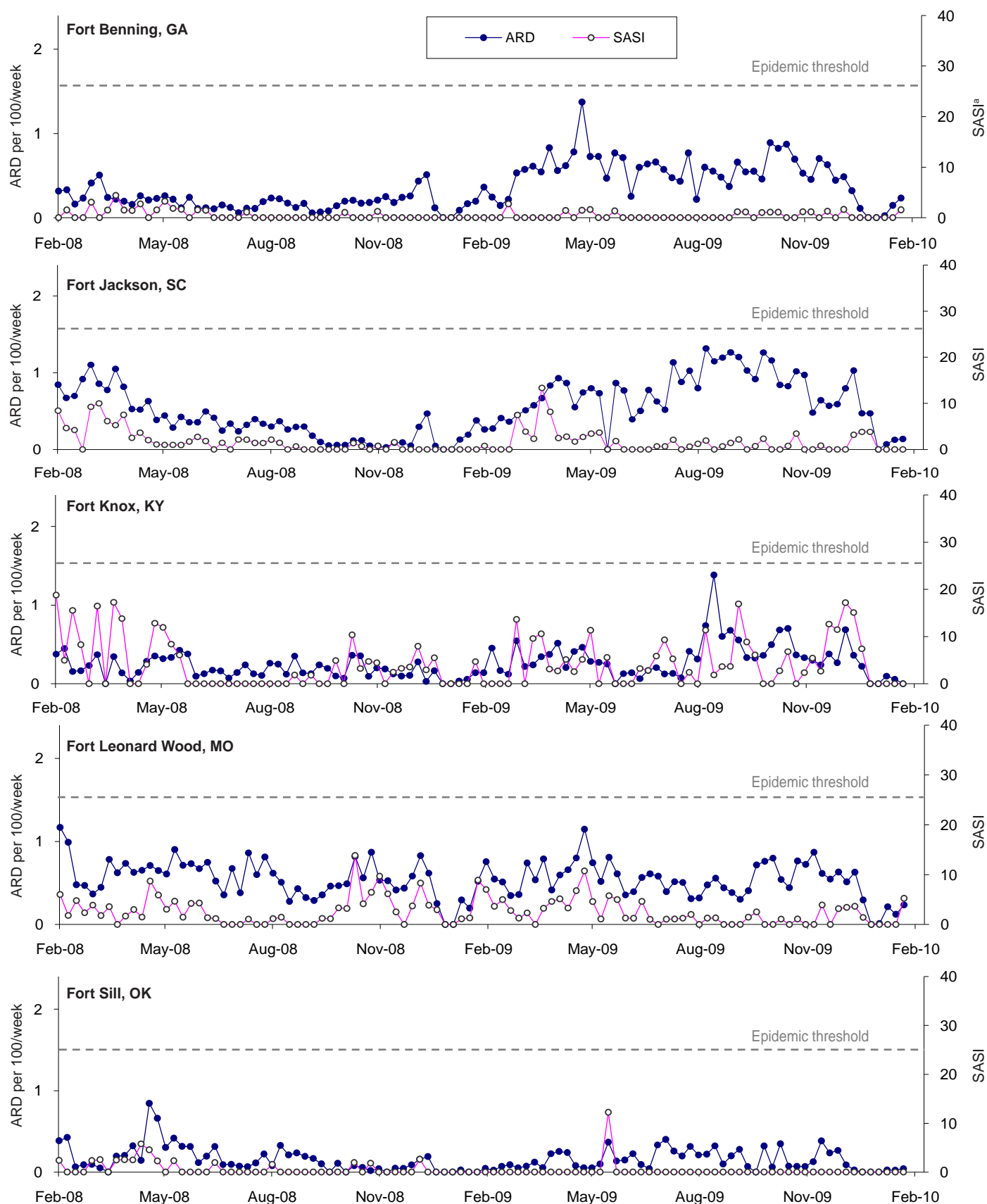
*Photo credit: New York Arm Wrestling Association*

#### References:

1. Ogawa K, Ui M. Humeral shaft fracture sustained during arm wrestling: report on 30 cases and review of the literature. 1997 *J Trauma* Feb;42(2):243-6.
2. United States Arm Wrestling Association. USAA Rules and Regulations May 2005. Accessed 1 March 2010 at <http://usarmwrestling.com/USAA%20Rules%20&%20Regs.htm>



# Acute respiratory disease (ARD) and streptococcal pharyngitis rates (SASI<sup>a</sup>), basic combat training centers, U.S. Army, by week, February 2008-February 2010



<sup>a</sup>Streptococcal-ARD surveillance index (SASI) = ARD rate x % positive culture for group A streptococcus

ARD rate = cases per 100 trainees per week

ARD rate  $\geq 1.5$  or SASI  $\geq 25.0$  for 2 consecutive weeks are surveillance indicators of epidemics

## Update: Deployment Health Assessments, U.S. Armed Forces, January 2010

Since January 2003, peaks and troughs in the numbers of pre- and post-deployment health assessment forms transmitted to the Armed Forces Health Surveillance Center generally corresponded to times of departure and return of large numbers of deployers. Since April 2006, numbers of post-deployment health reassessments (PDHRA) transmitted per month have ranged from 17,000 to 43,000 (**Table 1, Figure 1**).

During the past 12 months, the proportions of returned deployers who rated their health as “fair” or “poor” were 8-11% on post-deployment health assessment questionnaires and 11-14% on PDHRA questionnaires (**Figure 2**).

In general, on post-deployment assessments and reassessments, deployers in the Army and in reserve components were more likely than their respective counterparts to report health and exposure-related concerns (**Table 2, Figure 2**). Both active and reserve component members were more likely to report exposure concerns three to six months after compared to the time of return from deployment (**Figure 3**).

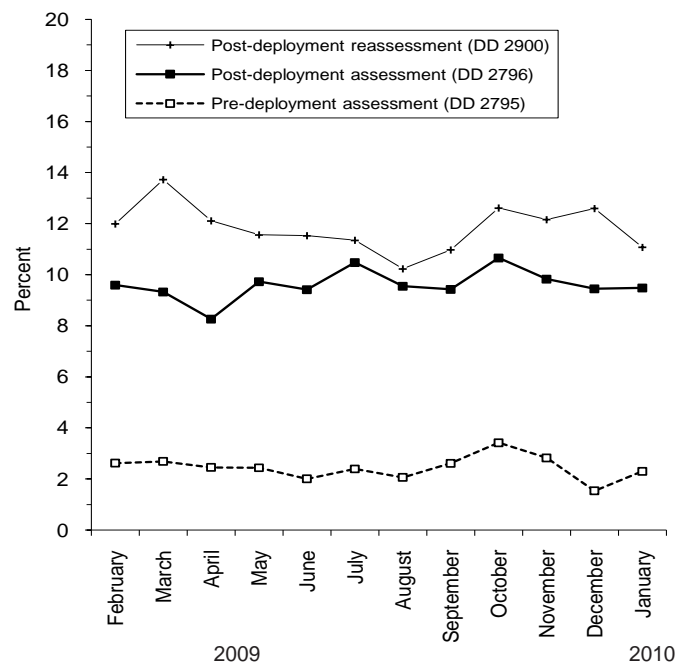
At the time of return from deployment, soldiers serving in the active component were the most likely of all deployers to receive mental health referrals; however, three to six months after returning, active component soldiers were less likely than Army and Marine Corps Reservists to receive mental health referrals (**Table 2**).

Finally, during the past three years, reserve component members have been more likely than active to report “exposure concerns” on post-deployment assessments and reassessments (**Figure 3**).

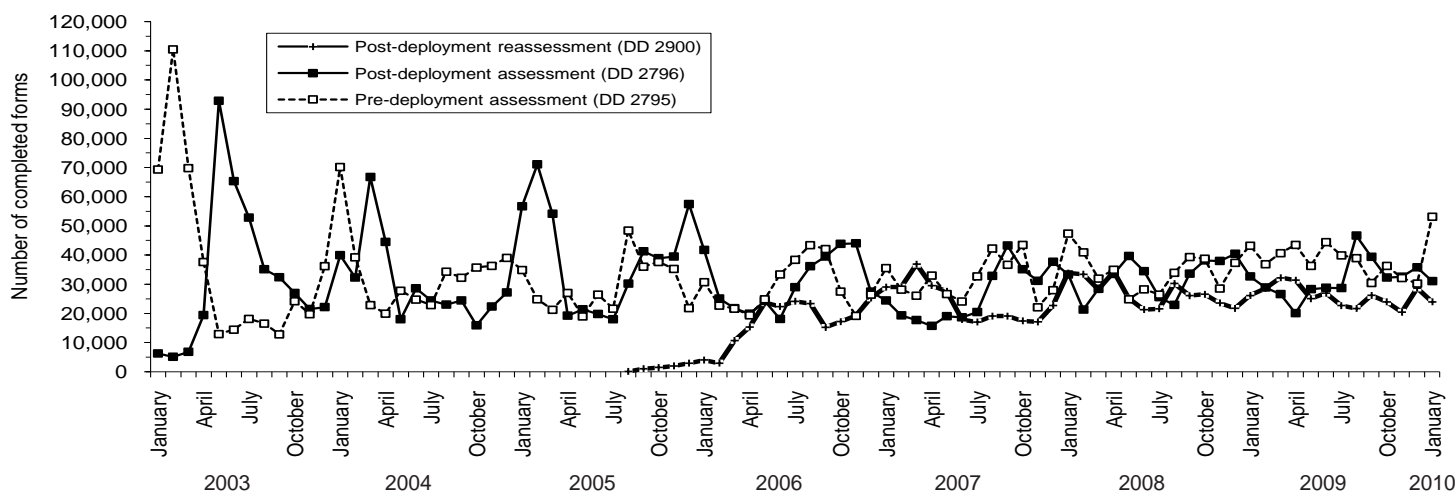
**Table 1.** Deployment-related health assessment forms, by month, U.S. Armed Forces, February 2009-January 2010

	Pre-deployment assessment DD2795		Post-deployment assessment DD2796		Post-deployment reassessment DD2900	
	No.	%	No.	%	No.	%
<b>Total</b>	<b>462,801</b>	<b>100</b>	<b>378,759</b>	<b>100</b>	<b>311,451</b>	<b>100</b>
<b>2009</b>						
February	36,907	8.0	28,818	7.6	28,563	9.2
March	40,649	8.8	26,557	7.0	32,201	10.3
April	43,505	9.4	20,015	5.3	31,357	10.1
May	36,265	7.8	28,310	7.5	25,032	8.0
June	44,405	9.6	28,761	7.6	26,936	8.6
July	39,870	8.6	28,701	7.6	22,647	7.3
August	38,977	8.4	46,686	12.3	21,668	7.0
September	30,464	6.6	39,368	10.4	26,144	8.4
October	36,339	7.9	32,225	8.5	23,933	7.7
November	32,095	6.9	32,577	8.6	20,390	6.5
December	30,212	6.5	35,745	9.4	28,654	9.2
<b>2010</b>						
January	53,113	11.5	30,996	8.2	23,926	7.7

**Figure 2.** Proportion of deployment health assessment forms with self-assessed health status as “fair” or “poor”, U.S. Armed Forces, February 2009-January 2010

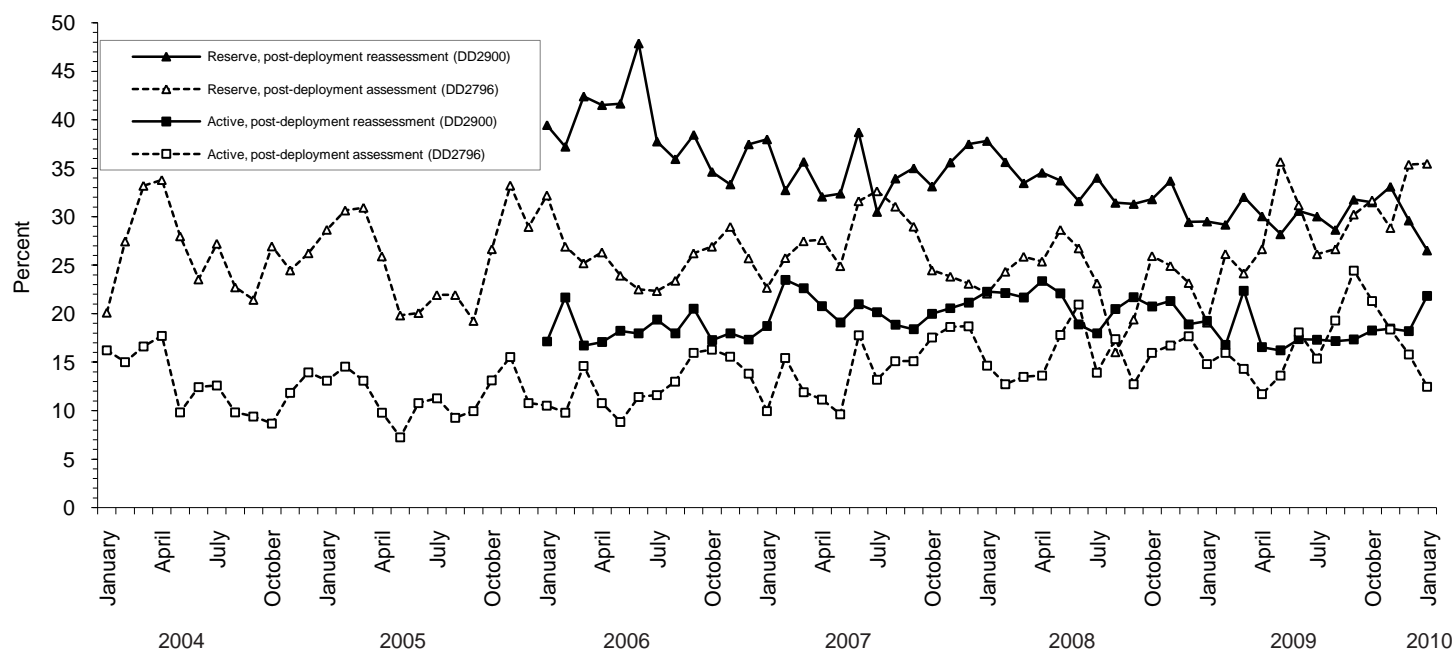


**Figure 1.** Total deployment health assessment and reassessment forms, by month, U.S. Armed Forces, January 2003-January 2010



**Table 2.** Percentage of service members who endorsed selected questions/received referrals on health assessment forms, U.S. Armed Forces, February 2009-January 2010

	Army			Navy			Air Force			Marine Corps			All service members		
	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900
	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=
Active component	153,383	133,104	120,623	19,890	10,735	14,408	59,863	52,477	51,912	34,484	22,598	36,621	267,620	218,914	223,564
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	3.9	10.6	14.7	1.3	4.7	5.9	0.5	3.5	4.2	1.7	6.9	9.4	2.7	8.2	10.8
Health concerns, not wound or injury	21.3	26.1	24.2	3.6	12.6	13.5	1.3	5.7	10.5	3.1	12.1	17.2	13.2	19.1	19.2
Health worse now than before deployed	na	23.0	26.1	na	12.7	13.0	na	8.4	8.6	na	14.6	18.1	na	18.2	19.9
Exposure concerns	na	18.1	18.9	na	19.7	18.5	na	11.5	14.7	na	15.9	20.6	na	16.4	18.2
PTSD symptoms (2 or more)	na	9.4	12.3	na	4.5	6.3	na	2.3	2.3	na	5.0	8.2	na	7.0	8.9
Depression symptoms (any)	na	31.3	32.3	na	20.9	22.7	na	13.0	13.8	na	25.6	29.5	na	25.8	26.9
Referral indicated by provider (any)	5.0	34.1	21.6	5.3	21.2	15.9	1.7	10.7	6.7	3.9	19.1	25.7	4.1	26.3	18.4
Mental health referral indicated <sup>a</sup>	1.0	7.0	7.4	0.7	3.3	5.8	0.5	1.3	1.8	0.3	1.8	4.9	0.8	4.9	5.6
Medical visit following referral <sup>b</sup>	95.5	99.6	98.4	92.4	86.3	90.6	81.0	96.7	98.5	62.1	76.5	90.7	90.8	97.1	96.2
Reserve component	Army			Navy			Air Force			Marine Corps			All service members		
	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900
	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=	n=
Reserve component	85,966	66,762	55,632	5,989	2,730	5,118	16,035	14,858	16,957	4,741	3,914	6,359	112,731	88,264	84,066
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	1.5	12.0	17.3	0.6	9.9	8.2	0.3	5.1	4.7	1.1	7.5	10.7	1.3	10.5	13.7
Health concerns, not wound or injury	16.2	34.6	43.7	1.5	35.9	30.3	0.6	8.7	14.7	3.2	21.8	35.5	12.7	29.7	36.4
Health worse now than before deployed	na	26.9	32.8	na	22.3	20.3	na	13.0	11.0	na	19.3	26.5	na	24.1	27.2
Exposure concerns	na	31.7	32.0	na	36.2	32.8	na	21.2	22.5	na	14.7	30.8	na	29.3	30.1
PTSD symptoms (2 or more)	na	8.7	19.4	na	6.0	10.7	na	2.2	3.0	na	3.1	14.5	na	7.3	15.2
Depression symptoms (any)	na	31.6	35.3	na	26.7	24.2	na	14.0	13.5	na	28.5	27.6	na	28.3	29.6
Referral indicated by provider (any)	3.6	36.6	34.1	3.2	30.1	18.0	0.5	13.5	5.7	3.4	26.7	26.9	3.1	32.1	26.9
Mental health referral indicated <sup>a</sup>	0.4	4.7	12.7	0.2	3.5	4.8	0.0	0.8	0.8	0.3	1.8	8.5	0.3	3.9	9.5
Medical visit following referral <sup>b</sup>	95.2	98.0	37.3	91.8	96.0	44.5	53.8	63.7	42.1	49.3	62.0	28.8	91.9	94.0	37.2

<sup>a</sup>Includes behavioral health, combat stress and substance abuse referrals.<sup>b</sup>Record of inpatient or outpatient visit within 6 months after referral.**Figure 3.** Proportion of service members who endorsed exposure concerns on post-deployment health assessments, U.S. Armed Forces, January 2004-January 2010

# Sentinel reportable events among service members and beneficiaries at U.S. Army medical facilities, cumulative numbers<sup>a</sup> for calendar years through 31 January 2009 and 31 January 2010



Army

Reporting locations	Number of reports all events <sup>b</sup>		Food-borne						Vaccine preventable					
			Campylo-bacter		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella <sup>c</sup>	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
<b>NORTHERN</b>														
Aberdeen Proving Ground, MD	3	0	.	.	.	.	.	.	.	.	.	.	.	.
Fort Belvoir, VA	18	0	.	.	.	.	.	.	.	.	.	.	.	.
Fort Bragg, NC	131	116	.	.	2	.	.	.	.	.	2	.	.	.
Fort Dix, NJ	0	0	.	.	.	.	.	.	.	.	.	.	.	.
Fort Drum, NY	0	0	.	.	.	.	.	.	.	.	.	.	.	.
Fort Eustis, VA	16	22	.	.	.	.	.	.	.	.	.	.	.	.
Fort George G Meade, MD	4	0	.	.	.	.	.	.	.	.	.	.	.	.
Fort Knox, TN	12	37	.	.	.	.	.	.	.	.	.	.	.	.
Fort Lee, VA	76	1	.	.	.	.	.	.	.	.	.	.	.	.
Fort Monmouth, NJ	6	0	.	.	.	.	.	.	.	.	.	.	.	.
Walter Reed AMC, DC	14	0	.	.	.	.	.	.	.	.	.	.	.	.
West Point Military Reservation, NY	4	3	.	.	.	.	.	.	.	.	.	.	.	.
<b>SOUTHERN</b>														
Fort Benning, GA	4	0	.	.	.	.	.	.	.	.	.	.	.	.
Fort Campbell, KY	0	55	.	.	.	.	.	.	.	.	.	.	.	.
Fort Gordon, GA	61	65	.	.	.	1	.	.	.	.	.	.	.	.
Fort Hood, TX	117	125	.	1	1	.	1	7	.	.	.	1	.	.
Fort Jackson, SC	0	21	.	.	.	.	.	.	.	.	.	.	.	.
Fort Polk, LA	29	31	.	.	.	.	.	.	.	.	.	.	.	.
Fort Rucker, AL	3	4	.	.	.	.	.	.	.	.	.	.	.	.
Fort Sam Houston, TX	44	43	.	.	.	.	.	.	.	.	.	.	.	.
Fort Sill, OK	20	3	.	.	.	.	.	.	.	.	.	.	.	.
Fort Stewart, GA	87	50	.	1	.	1	.	.	.	.	.	.	.	.
<b>WESTERN</b>														
Fort Bliss, TX	37	24	.	.	.	.	.	.	1	.	1	.	.	.
Fort Carson, CO	32	56	1	3	.	.	.	.	.	.	.	.	.	.
Fort Huachuca, AZ	6	1	.	.	.	.	.	.	.	.	.	.	.	.
Fort Leavenworth, KS	8	2	.	.	.	.	.	.	.	.	.	.	.	.
Fort Leonard Wood, MO	26	42	.	.	.	1	.	.	1	.	.	.	.	.
Fort Lewis, WA	106	76	.	1	.	1	.	.	.	.	.	.	.	.
Fort Riley, KS	31	1	.	.	.	.	.	.	.	.	.	.	.	.
Fort Wainwright, AK	18	15	.	.	.	.	.	.	.	.	.	.	.	.
NTC and Fort Irwin, CA	2	14	.	.	.	.	1	.	.	.	.	.	.	.
<b>PACIFIC</b>														
Hawaii	56	63	2	1	.	.	.	1	.	.	.	.	.	.
Japan	2	0	.	.	.	.	.	.	.	.	.	.	.	.
Korea	80	11	.	.	.	.	.	.	.	.	.	.	.	.
<b>EUROPEAN</b>														
Heidelberg	8	8	2	3	1	.	.	.	.	.	.	.	.	.
Landstuhl	11	47	.	1	.	.	.	.	.	.	.	.	1	.
Bavaria	8	15	1	1	.	.	.	.	.	.	.	.	.	.
<b>OTHER LOCATIONS</b>														
OTHER	0	0	.	.	.	.	.	.	.	.	.	.	.	.
<b>Total</b>	<b>1,080</b>	<b>951</b>	<b>6</b>	<b>12</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>8</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>0</b>

<sup>a</sup>Events reported by Feb 25, 2009 and 2010<sup>b</sup>Sixty-seven medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, June 2009.<sup>c</sup>Service member cases only.

Note: Completeness and timeliness of reporting vary by facility.

# Sentinel reportable events among service members and beneficiaries at U.S. Army medical facilities, cumulative numbers<sup>a</sup> for calendar years through 31 January 2009 and 31 January 2010



Army

Reporting location	Arthropod-borne				Sexually transmitted						Environmental				Travel associated			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis		Cold <sup>c</sup>		Heat <sup>c</sup>		Q Fever		Tuberculosis	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
<b>NORTHERN</b>																		
Aberdeen Proving Ground, MD	.	.	.	.	2	.	1	.	.	.	.	.	.	.	.	.	.	.
Fort Belvoir, VA	.	.	.	.	14	.	4	.	.	.	.	.	.	.	.	.	.	.
Fort Bragg, NC	.	.	.	.	106	95	21	20	.	1	.	.	.	.	.	.	.	.
Fort Dix, NJ	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fort Drum, NY	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fort Eustis, VA	.	.	.	.	12	19	4	3	.	.	.	.	.	.	.	.	.	.
Fort George G Meade, MD	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.
Fort Knox, TN	.	.	.	.	10	34	2	3	.	.	.	.	.	.	.	.	.	.
Fort Lee, VA	.	.	.	.	64	1	12	.	.	.	.	.	.	.	.	.	.	.
Fort Monmouth, NJ	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.
Walter Reed AMC, DC	1	.	.	.	9	.	2	.	1	.	.	.	.	.	.	.	1	.
West Point Military Reservation, NY	.	1	.	.	4	1	.	1	.	.	.	.	.	.	.	.	.	.
<b>SOUTHERN</b>																		
Fort Benning, GA	.	.	2	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Fort Campbell, KY	.	.	.	.	.	53	.	2	.	.	.	.	.	.	.	.	.	.
Fort Gordon, GA	.	.	.	.	53	53	8	11	.	.	.	.	.	.	.	.	.	.
Fort Hood, TX	.	.	1	.	87	92	27	23	1	.	.	.	.	.	.	.	.	.
Fort Jackson, SC	.	.	.	.	.	18	.	3	.	.	.	.	.	.	.	.	.	.
Fort Polk, LA	.	.	.	.	27	27	2	4	.	.	.	.	.	.	.	.	.	.
Fort Rucker, AL	.	.	.	.	2	4	1	.	.	.	.	.	.	.	.	.	.	.
Fort Sam Houston, TX	.	.	.	.	36	38	8	5	.	.	.	.	.	.	.	.	.	.
Fort Sill, OK	.	.	.	.	16	2	4	1	.	.	.	.	.	.	.	.	.	.
Fort Stewart, GA	.	.	.	.	75	43	10	5	2	.	.	.	.	.	.	.	.	.
<b>WESTERN</b>																		
Fort Bliss, TX	.	.	.	.	29	19	5	5	1	.	.	.	.	.	.	.	.	.
Fort Carson, CO	.	.	.	.	30	50	1	3	.	.	.	.	.	.	.	.	.	.
Fort Huachuca, AZ	.	.	.	.	6	.	.	.	.	.	.	.	1	.	.	.	.	.
Fort Leavenworth, KS	.	.	.	.	5	2	2	.	1	.	.	.	.	.	.	.	.	.
Fort Leonard Wood, MO	.	.	.	.	23	37	2	4	.	.	.	.	.	.	.	.	.	.
Fort Lewis, WA	.	.	.	.	95	68	11	6	.	.	.	.	.	.	.	.	.	.
Fort Riley, KS	.	.	.	.	23	1	7	.	.	.	1	.	.	.	.	.	.	.
Fort Wainwright, AK	.	.	.	.	15	8	3	.	.	.	.	7	.	.	.	.	.	.
NTC and Fort Irwin, CA	.	.	.	.	1	13	.	1	.	.	.	.	.	.	.	.	.	.
<b>PACIFIC</b>																		
Hawaii	.	.	.	.	51	56	2	5	.	.	.	.	.	.	1	.	.	.
Japan	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Korea	.	.	.	.	77	4	2	.	.	.	1	7	.	.	.	.	.	.
<b>EUROPEAN</b>																		
Heidelberg	.	.	.	.	5	4	.	1	.	.	.	.	.	.	.	.	.	.
Landstuhl	.	.	2	.	9	35	1	9	.	.	.	.	.	.	.	.	.	.
Bavaria	.	.	.	.	7	13	.	1	.	.	.	.	.	.	.	.	.	.
<b>OTHER LOCATIONS</b>																		
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<b>Total</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>907</b>	<b>790</b>	<b>142</b>	<b>116</b>	<b>6</b>	<b>1</b>	<b>2</b>	<b>14</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>



# Sentinel reportable events among service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers<sup>a</sup> for calendar years through 31 January 2009 and 31 January 2010



Navy

Reporting locations	Number of reports all events <sup>b</sup>		Food-borne						Vaccine preventable					
			Campylobacter		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella <sup>c</sup>	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
<b>NATIONAL CAPITOL AREA</b>														
NNMC Bethesda, MD	23	12	.	2	.	.	.	1	.	.	.	1	.	.
NHC Annapolis, MD	2	4	.	.	.	.	.	.	.	.	.	.	.	.
NHC Patuxent River, MD	1	0	.	.	.	.	.	.	.	.	.	.	.	.
NHC Quantico, VA	14	2	.	.	1	.	.	.	.	.	.	.	.	.
<b>NAVY MEDICINE EAST</b>														
NH Beaufort, SC	151	46	.	.	.	.	.	.	.	.	.	.	.	.
NH Camp Lejeune, NC	48	41	.	.	2	.	.	.	.	.	.	.	.	.
NH Charleston, SC	3	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Cherry Point, NC	3	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Corpus Christi, TX	0	0	.	.	.	.	.	.	.	.	.	.	.	.
NHC Great Lakes, IL	6	65	.	.	.	.	.	.	.	.	.	.	.	.
NH Guantanamo Bay, Cuba	0	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Jacksonville, FL	25	13	.	.	1	2	.	.	.	.	.	.	.	.
NH Naples, Italy	0	0	.	.	.	.	.	.	.	.	.	.	.	.
NHC New England, RI	0	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Pensacola, FL	4	23	.	.	.	1	.	.	.	.	.	.	.	.
NMC Portsmouth, VA	35	32	.	.	.	.	.	.	.	.	.	.	.	.
NH Rota, Spain	0	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Sigonella, Italy	1	0	.	.	.	.	.	.	.	.	.	.	1	.
<b>NAVY MEDICINE WEST</b>														
NH Bremerton, WA	2	1	.	.	.	.	.	.	.	.	.	1	.	.
NH Camp Pendleton, CA	6	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Guam-Agana, Guam	5	0	.	.	.	.	.	.	.	.	.	.	.	.
NHC Hawaii, HI	0	1	.	.	.	.	.	.	.	.	.	.	.	.
NH Lemoore, CA	5	1	.	.	.	.	.	.	.	.	.	.	.	.
NH Oak Harbor, WA	14	4	1	.	1	.	.	.	.	.	.	.	.	.
NH Okinawa, Japan	0	0	.	.	.	.	.	.	.	.	.	.	.	.
NMC San Diego, CA	91	61	.	1	3	.	.	.	.	.	8	2	.	.
NH Twentynine Palms, CA	1	0	.	.	.	.	.	.	.	.	.	.	.	.
NH Yokosuka, Japan	10	5	.	.	.	.	.	.	.	.	1	1	.	.
<b>NAVAL SHIPS</b>														
COMNAVAIRLANT/CINCLANTFLEET	14	0	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	6	6	.	.	.	.	.	.	.	.	.	.	.	.
<b>OTHER LOCATIONS</b>														
OTHER	333	259	4	.	2	.	.	.	.	.	.	5	1	.
<b>Total</b>	<b>803</b>	<b>576</b>	<b>5</b>	<b>3</b>	<b>10</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>10</b>	<b>2</b>	<b>0</b>

<sup>a</sup>Events reported by Feb 25, 2010<sup>b</sup>Sixty-seven medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, June 2009.<sup>c</sup>Service member cases only.

Note: Completeness and timeliness of reporting vary by facility.

# Sentinel reportable events among service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers<sup>a</sup> for calendar years through 31 January 2009 and 31 January 2010



Navy

Reporting location	Arthropod-borne				Sexually transmitted						Environmental				Travel associated			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis		Cold <sup>c</sup>		Heat <sup>c</sup>		Q Fever		Tuberculosis	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
<b>NATIONAL CAPITOL AREA</b>																		
NNMC Bethesda, MD	.	.	.	.	19	2	4	1	.	5	.	.	.	.	.	.	.	.
NHC Annapolis, MD	.	.	.	.	2	4	.	.	.	.	.	.	.	.	.	.	.	.
NHC Patuxent River, MD	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
NHC Quantico, VA	.	.	.	.	13	2	.	.	.	.	.	.	.	.	.	.	.	.
<b>NAVY MEDICINE EAST</b>																		
NH Beaufort, SC	.	.	.	.	142	41	8	5	1	.	.	.	.	.	.	.	.	.
NH Camp Lejeune, NC	.	1	1	.	36	31	8	6	.	.	.	2	1	1	.	.	.	.
NH Charleston, SC	.	.	.	.	2	.	1	.	.	.	.	.	.	.	.	.	.	.
NH Cherry Point, NC	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.
NH Corpus Christi, TX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NHC Great Lakes, IL	.	.	.	.	6	57	.	8	.	.	.	.	.	.	.	.	.	.
NH Guantanamo Bay, Cuba	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NH Jacksonville, FL	.	.	.	.	24	11	.	.	.	.	.	.	.	.	.	.	.	.
NH Naples, Italy	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NHC New England, RI	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NH Pensacola, FL	.	.	.	.	2	17	.	3	.	2	.	.	.	.	2	.	.	.
NMC Portsmouth, VA	.	.	.	.	25	29	9	3	.	.	.	.	.	.	.	.	1	.
NH Rota, Spain	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NH Sigonella, Italy	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<b>NAVY MEDICINE WEST</b>																		
NH Bremerton, WA	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
NH Camp Pendleton, CA	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.
NH Guam-Agana, Guam	.	.	.	.	4	.	1	.	.	.	.	.	.	.	.	.	.	.
NHC Hawaii, HI	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
NH Lemoore, CA	.	.	.	.	5	.	.	1	.	.	.	.	.	.	.	.	.	.
NH Oak Harbor, WA	.	.	.	.	12	4	.	.	.	.	.	.	.	.	.	.	.	.
NH Okinawa, Japan	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NMC San Diego, CA	.	.	2	.	63	51	11	7	2	.	.	.	2	.	.	.	.	.
NH Twentynine Palms, CA	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
NH Yokosuka, Japan	.	.	.	.	9	4	.	.	.	.	.	.	.	.	.	.	.	.
<b>NAVAL SHIPS</b>																		
COMNAVAIRLANT/CINCLANTFLEET	.	.	.	.	14	.	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	.	.	.	.	6	6	.	.	.	.	.	.	.	.	.	.	.	.
<b>OTHER LOCATIONS</b>																		
Other	4	3	2	3	289	220	24	28	3	.	.	.	3	.	.	.	1	.
<b>Total</b>	<b>4</b>	<b>4</b>	<b>5</b>	<b>3</b>	<b>685</b>	<b>480</b>	<b>66</b>	<b>62</b>	<b>7</b>	<b>7</b>	<b>0</b>	<b>2</b>	<b>6</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>

# Sentinel reportable events among service members and beneficiaries at U.S. Air Force medical facilities, cumulative numbers<sup>a</sup> for calendar years through 31 January 2009 and 31 January 2010



Air Force

Reporting locations	Number of reports all events <sup>b</sup>		Food-borne						Vaccine preventable					
			Campylo-bacter		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella <sup>c</sup>	
			2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
Air Combat Cmd	87	51	1	.	.	.	.	.	.	.	1	.	2	1
Air Education & Training Cmd	140	78	.	.	1	.	.	.	1	1	2	1	.	.
Air Force Dist. of Washington	23	11	.	.	1	.	.	.	.	.	1	.	.	.
Air Force Materiel Cmd	49	21	.	.	.	.	.	.	.	.	.	.	.	.
Air Force Special Ops Cmd	19	12	.	.	.	.	.	1	.	.	.	.	.	.
Air Force Space Cmd	31	22	.	.	.	1	.	.	.	.	.	.	.	.
Air Mobility Cmd	86	43	.	.	1	.	.	.	.	.	1	.	1	.
Pacific Air Forces	46	25	.	.	.	.	.	1	.	.	2	.	.	.
U.S. Air Forces in Europe	48	16	.	.	.	.	.	.	.	.	1	.	.	.
U.S. Air Force Academy	4	2	.	.	1	.	.	.	.	.	.	.	.	1
Other	2	2	.	.	.	.	.	.	.	.	.	.	.	.
<b>Total</b>	<b>535</b>	<b>283</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>7</b>	<b>2</b>	<b>3</b>	<b>2</b>

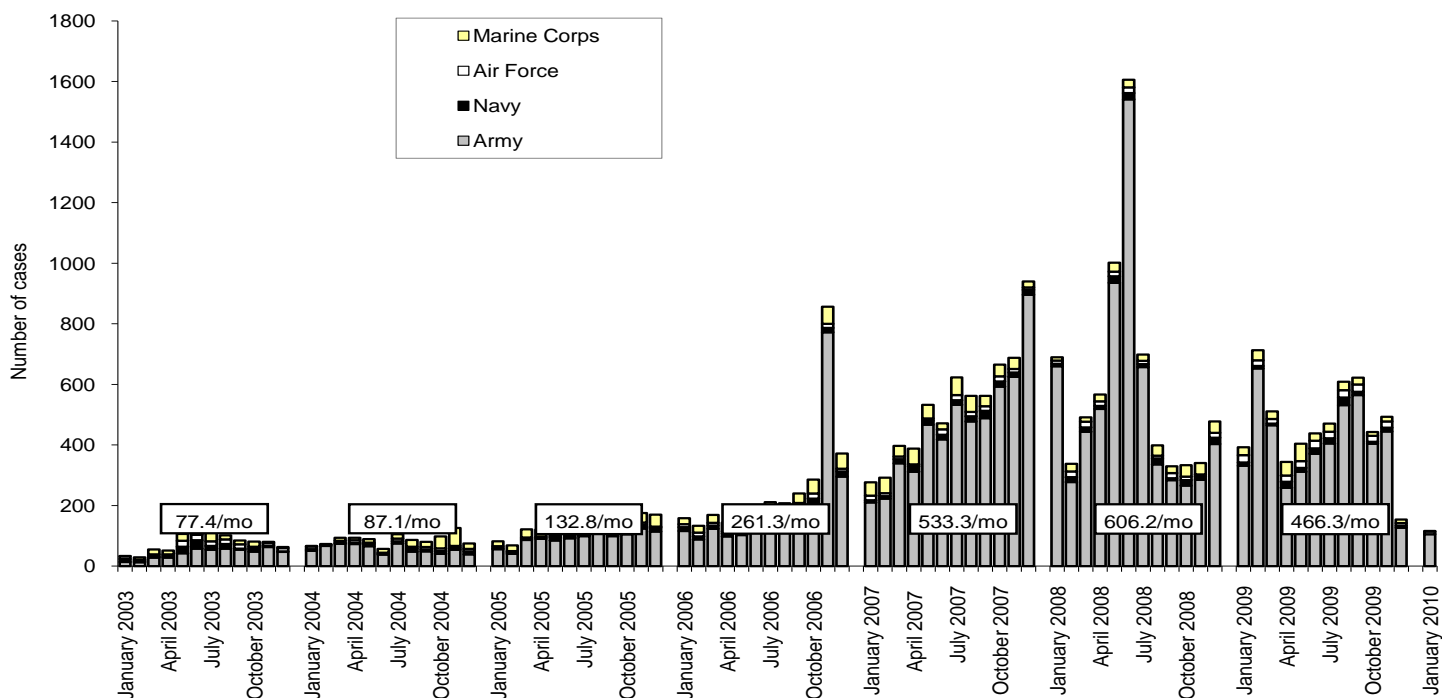
<sup>a</sup>Events reported by Feb 25, 2010<sup>b</sup>Medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, June 2009.<sup>c</sup>Service member cases only.

Note: Completeness and timeliness of reporting vary by facility.

Reporting location	Arthropod-borne				Sexually transmitted						Environmental				Travel associated			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis		Cold <sup>c</sup>		Heat <sup>c</sup>		Q Fever		Tuberculosis	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
Air Combat Cmd	.	.	.	.	68	39	13	7	.	1	3	2	.	.	.	.	.	.
Air Education & Training Cmd	.	.	.	.	118	71	17	5	1	.	.	.	.	.	.	.	.	.
Air Force Dist. of Washington	.	1	.	.	19	8	2	2	.	.	.	.	.	.	.	.	.	.
Air Force Materiel Cmd	1	.	.	.	43	18	4	3	1	.	.	.	.	.	.	.	.	.
Air Force Special Ops Cmd	.	.	.	.	18	9	1	1	.	.	.	1	.	.	.	.	.	.
Air Force Space Cmd	.	.	.	1	30	19	1	1	.	.	.	.	.	.	.	.	.	.
Air Mobility Cmd	3	.	.	.	63	39	12	4	.	.	5	.	.	.	.	.	.	.
Pacific Air Forces	.	.	.	.	34	21	6	2	.	1	4	.	.	.	.	.	.	.
U.S. Air Forces in Europe	.	.	.	.	40	13	5	3	.	.	1	.	.	.	.	.	1	.
U.S. Air Force Academy	.	.	.	.	3	1	.	.	.	.	.	.	.	.	.	.	.	.
Other	.	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.
<b>Total</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>437</b>	<b>239</b>	<b>62</b>	<b>29</b>	<b>2</b>	<b>2</b>	<b>13</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>

## Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - January 2010 (data as of 25 February 2010)

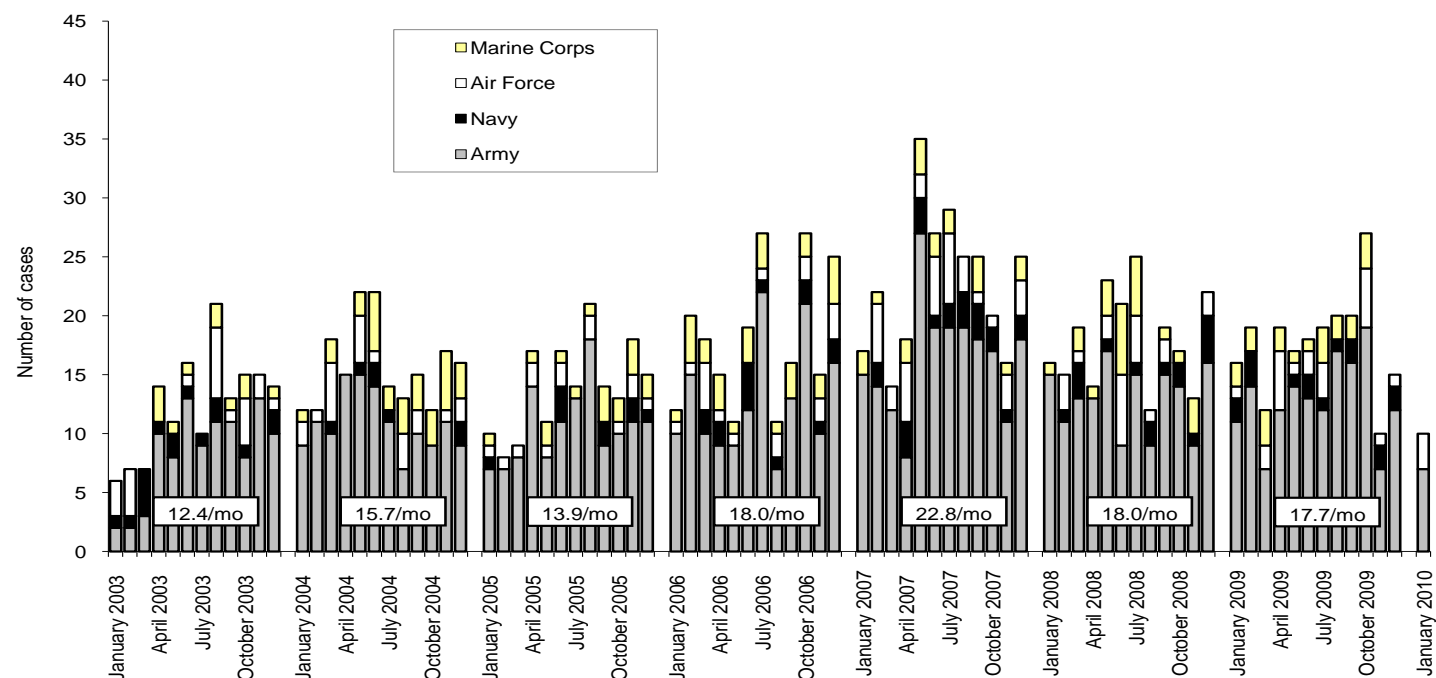
Traumatic brain injury (ICD-9: 310.2, 800-801, 803-804, 850-854, 907.0, 950.1-950.3, 959.01, V15.5\_1-9, V15.5\_A-F, V15.59\_1-9, V15.59\_A-F)<sup>a</sup>



Reference: Armed Forces Health Surveillance Center. Deriving case counts from medical encounter data: considerations when interpreting health surveillance reports. *MSMR*. Dec 2009;16(12):2-8.

<sup>a</sup>Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 30 days of returning from OEF/OIF. Includes in-theater medical encounters from the Theater Medical Data Store (TMDS). Excludes 1,934 individuals with a prior TBI-related encounter.

Deep vein thrombophlebitis/pulmonary embolus (ICD-9: 415.1, 451.1, 451.81, 451.83, 451.89, 453.2, 453.40 - 453.42 and 453.8)<sup>b</sup>

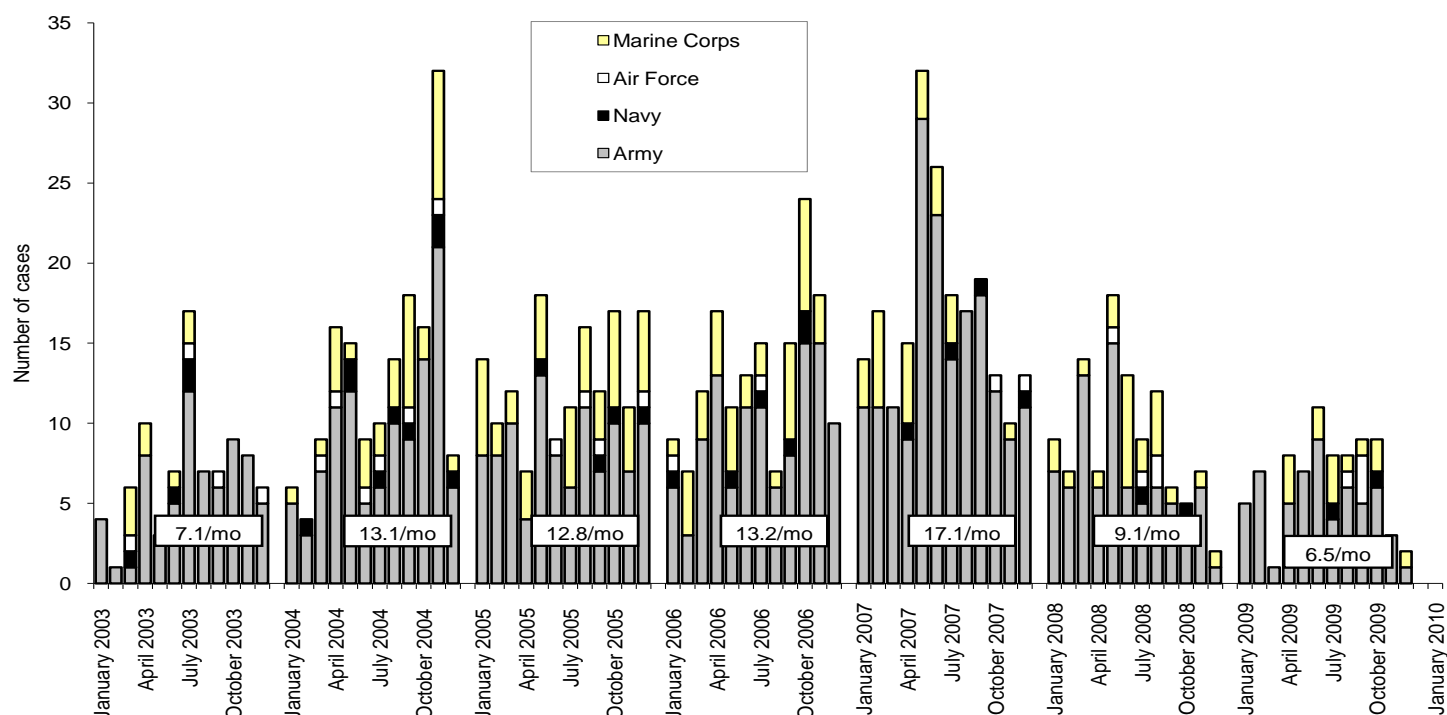


Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res*. 2006;117(4):379-83.

<sup>b</sup>One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 90 days of returning from OEF/OIF.

## Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - January 2010 (data as of 25 February 2010)

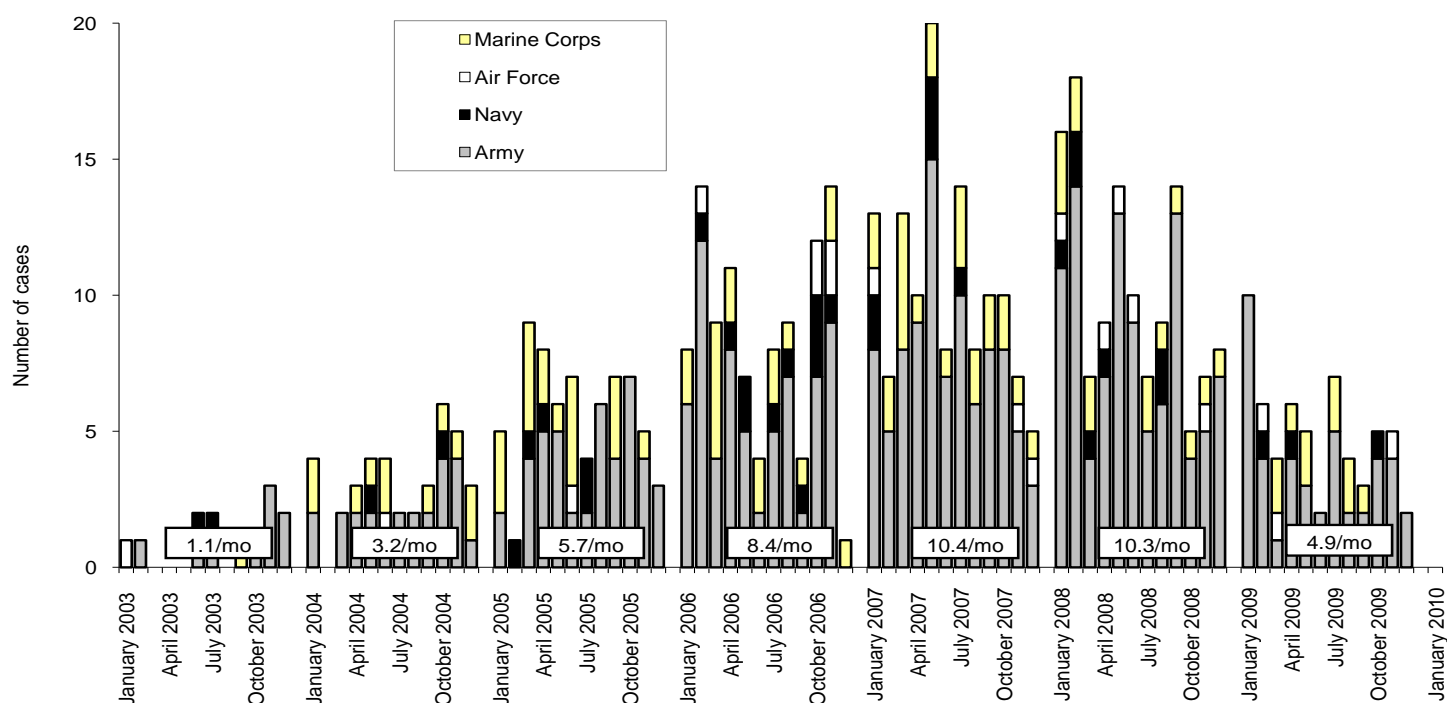
Amputations (ICD-9: 887, 896, 897, V49.6 except V49.61-V49.62, V49.7 except V49.71-V49.72, PR 84.0-PR 84.1, except PR 84.01-PR 84.02 and PR 84.11)<sup>a</sup>



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: amputations. Amputations of lower and upper extremities, U.S. Armed Forces, 1990-2004. *MSMR*. Jan 2005;11(1):2-6.

<sup>a</sup>Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 365 days of returning from OEF/OIF.

## Heterotopic ossification (ICD-9: 728.12, 728.13, 728.19)<sup>b</sup>



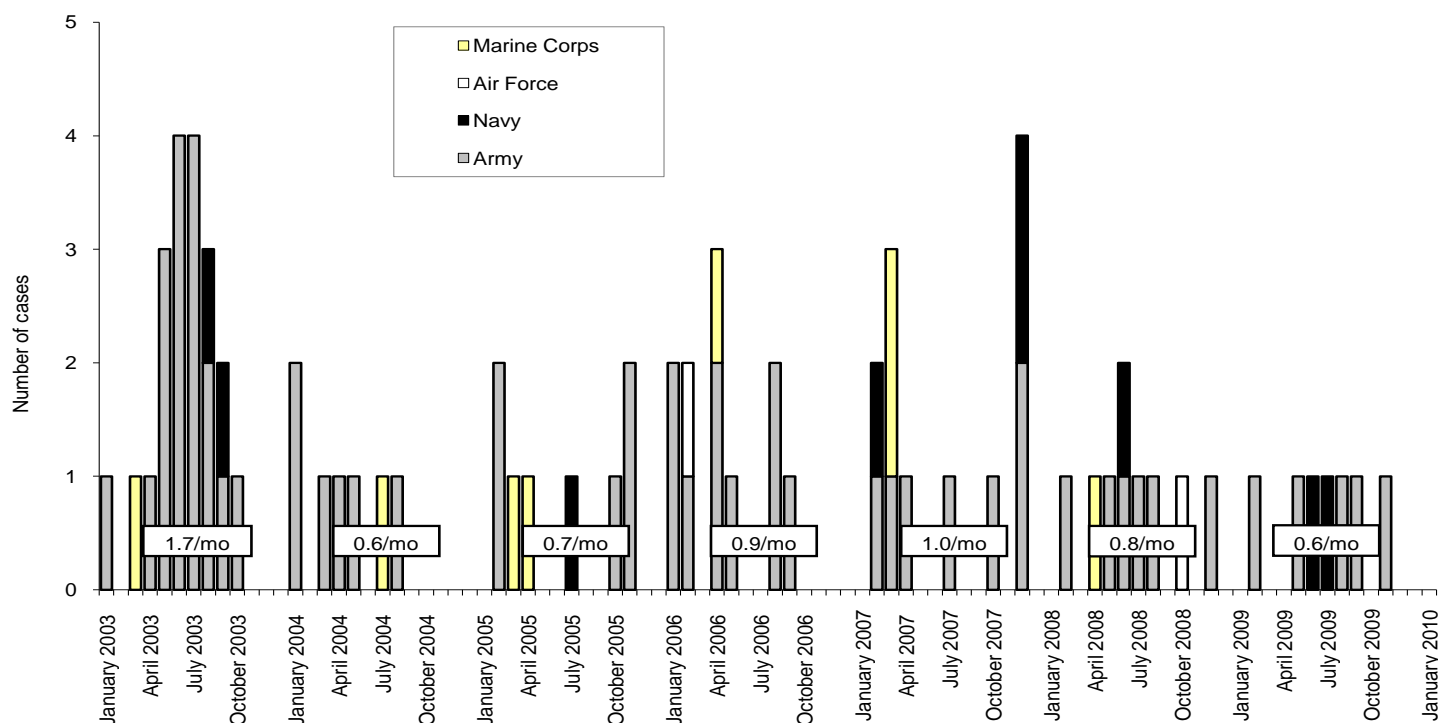
Reference: Army Medical Surveillance Activity. Heterotopic ossification, active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):7-9.

<sup>b</sup>One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 365 days of returning from OEF/OIF.



## Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - January 2010 (data as of 25 February 2010)

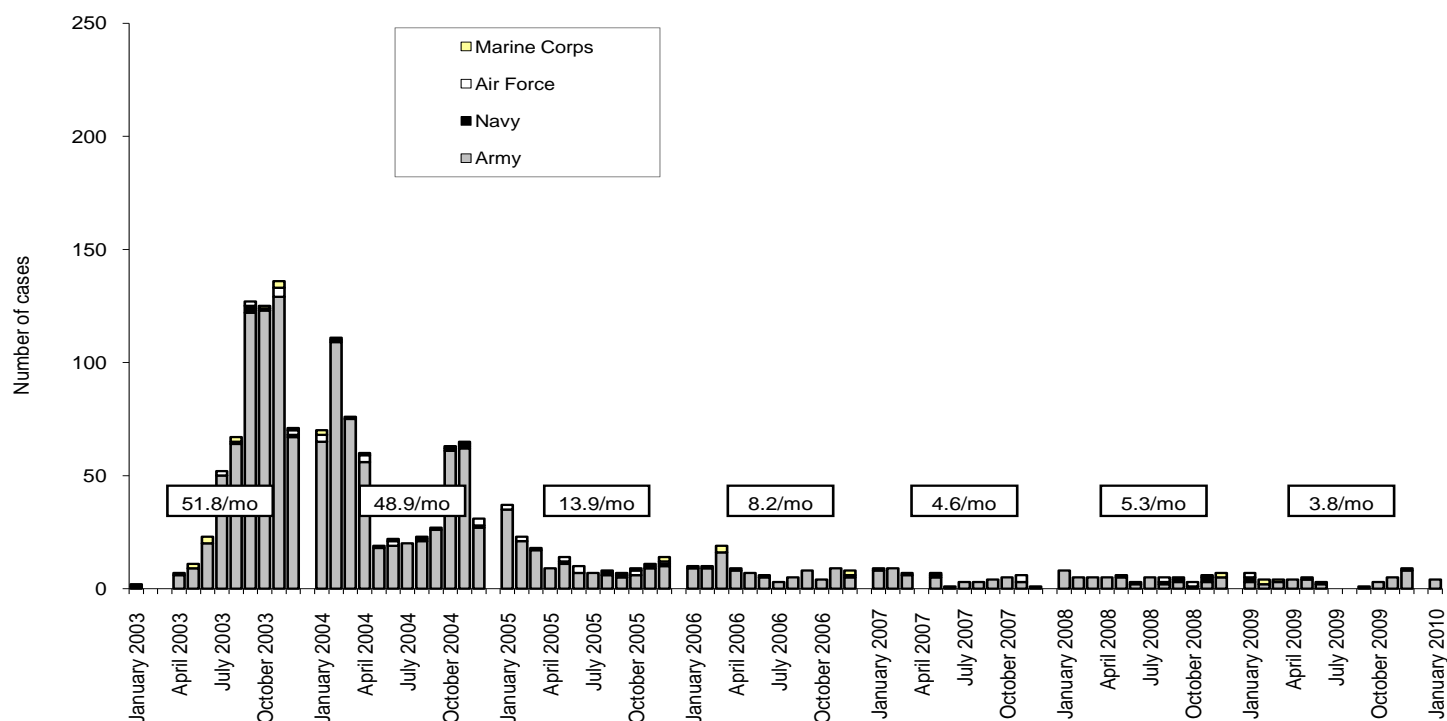
Severe acute pneumonia (ICD-9: 518.81, 518.82, 480-487, 786.09)<sup>a</sup>



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: severe acute pneumonia. Hospitalizations for acute respiratory failure (ARF)/acute respiratory distress syndrome (ARDS) among participants in Operation Enduring Freedom/Operation Iraqi Freedom, active components, U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):6-7.

<sup>a</sup>Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

Leishmaniasis (ICD-9: 085.0 to 085.9)<sup>b</sup>



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: leishmaniasis. Leishmaniasis among U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):2-4.

<sup>b</sup>Indicator diagnosis (one per individual) during a hospitalization, ambulatory visit, and/or from a notifiable medical event during/after service in OEF/OIF.

Commander  
U.S. Army Public Health Command (Provisional)  
ATTN: MCHB-TS-EDM  
5158 Blackhawk Road  
Aberdeen Proving Ground, MD 21010-5422

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Inquiries regarding content or material to be considered for publication should be directed to: Editor, Armed Forces Health Surveillance Center, 2900 Linden Lane, Suite 200 (Attn: MCHB-TS-EDM), Silver Spring, MD 20910. E-mail: [msmr.afhsc@amedd.army.mil](mailto:msmr.afhsc@amedd.army.mil)

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